

UNIVERSITY OF TORONTO



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PRACTICAL OBSERVATIONS

O N

AMPUTATION,

A N D T H E

AFTER-TREATMENT:

TO WHICH IS ADDED, AN ACCOUNT OF THE

AMPUTATION ABOVE THE ANCLE

WITH A FLAP:

The whole illustrated by CASES.

BY EDWARD ALANSON,  
SURGEON TO THE LIVERPOOL INFIRMARY.

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*Believe me, one grain of matter of fact, to a practical surgeon, is  
worth a pound of reasoning.*

KIRKLAND's *Letters to a young Surgeon.*

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THE SECOND EDITION, GREATLY ENLARGED.

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L O N D O N,

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TO THE  
PRESIDENT,  
TREASURER,  
AND  
TRUSTEES  
OF THE  
LEVERPOOL INFIRMARY.

GENTLEMEN,

**I** Eagerly embrace the  
opportunity which this  
Publication affords, to ac-  
knowledge the honour you  
conferred upon me, by  
a 2                    electing

iv DEDICATION.

electing me to the office with which I have, by your partiality, been several years intrusted ; and to inform you that this my station, has enabled me to make some Surgical Observations, which, I have reason to believe, will prove beneficial to mankind ; particularly at this juncture, when so many thousands of different nations are engaged in war.

IF in your Public Infirmary, the objects be not  
only

## DEDICATION. v

only treated with great humanity and success, but the art of surgery be likewise improved ; it plainly appears that the utility of these houses is by no means confined to the objects they contain, but may be extended to all ranks, nations, and ages.

YOU must have observed with pleasure, that necessary unanimity which prevails amongst the medical people within your walls.

vi DEDICATION.

To you, Gentlemen, who have the welfare of this Infirmary so constantly in view, these sheets are addressed, with the most cordial assurances on my part, that while I have health, you may always command my utmost attention.

*I am,*

*Your most obedient*

*humble Servant,*

*Baynett Street,  
April 20, 1782.*

EDWARD ALANSON.

## P R E F A C E.

**W**HEN we attempt to introduce any new and important deviations from the common mode of practice into general use, and particularly in a point of such consequence, as the directing almost a total change in the mode of performing and after-treating one of the principal operations in surgery, the public have a right to be fully acquainted with the author's reasons and motives for such attempt ; and

viii      P R E F A C E.

such trials should likewise previously have been made, as are sufficient to demonstrate, that the doctrine recommended will bear the test of general experience.

I HAVE taken some pains to inform myself, what other practitioners are doing in other hospitals ; and from such unprejudiced authority as I can fully rely upon, I am convinced that too little skin is saved ; the muscles are generally divided by a perpendicular circular incision ; no union is attempted by the first intention ; the parts are dressed with dry lint ; and by many the arteries are tied with the needle, including the nerves, veins, and adjacent parts.

HENCE



## P R E F A C E. ix

HENCE more frequently will arise spasms, brisk symptomatic fever, hæmorrhage, large discharge of matter, retraction of the muscles, and exfoliation. The treatment which it is the intention of this little essay to recommend, may be considered as a powerful preventive of these disagreeable symptoms; and I am assured, our cures are completed in half the time requisite under the common practice: these are my reasons for addressing the public.

I MOST earnestly recommend the treatment here described to the consideration of the army and navy-surgeons. No doubt there  
are

x P R E F A C E.

are men of experience and judgment in these stations ; but I am sorry to observe, that I have seen some late instances of their treatment, and heard of others, where so little attention has been directed to save a sufficient quantity of skin, that the bones have projected, and the cure proved either impracticable, or uncommonly tedious ; nor is this unusual where the operation is done even by men who hold a first rank in the profession.

AMONGST all the calamities to which the human species are liable, there is not perhaps one more deplorable, than to be reduced

duced to the necessity of parting with a limb, as the only alternative to preserve life. So strongly is the desire of life implanted by the Divine Architect, that when put to the above test, few persons have resolution to refuse the chance of preserving it, which is given them by the removal of a diseased limb. In this country, both sexes, all ages, the timid and the brave, generally prefer amputation to certain death.

AMPUTATION, as said by an eminent writer, “ is an operation terrible to bear, horrid to see, and must leave the person on whom it has been performed, in  
a mu-

a mutilated imperfect state." And is not this distressing state much increased, when the operation is done upon so ill-formed a plan, as in some cases to preclude almost the possibility of a cure; or at least, to render it more painful and tedious, besides greatly diminishing the chances of obtaining the grand object, the preservation of life? Yet, that this is frequently the case, we meet with almost daily instances in proof; where nature, although properly assisted, is not able to cure the wound so injudiciously constructed by art.

HAD I been aware of the utility of such an attention, I should  
not

P R E F A C E.      xiii

not have omitted taking an accurate history of every amputation, at which I have been present. However, the following heads of success may be relied upon, and I hope will answer my present purpose.

PREVIOUS to our improved plan, out of forty-six amputations, at which I was present, and had an opportunity of inspecting the after-treatment, ten died: one, of the locked jaw; two, of hæmorrhage from the whole surface of the stump; four, of the hectic fever, and extensive suppurations; and three, from a spreading gangrene on the surface of the stump.

Eighteen

## xiv P R E F A C E.

Eighteen had an hæmorrhage : six, from the whole surface of the wound ; and twelve, from a particular vessel or vessels. In nearly the whole, the symptomatic fever was violent ; the startings or spasms frequent ; the suppuration large ; the surface of the wound extensive ; and in all, the first dressings were painful. In most of them, there was an exfoliation ; in several, a sugar-loaf stump ; and in some, the wound remained incurable.

THE above was a mixture of hospital and private practice, and I believe most people, who pursue the old method of operation, have not better success.

I HAVE

I HAVE never refused to operate upon any case that has presented, where a single person in consultation has thought such operation adviseable ; and since I began the method here recommended in Case I, I have operated in thirty-five cases, such as promiscuously occurred at the Liverpool Infirmary, without the loss of a single patient. The symptomatic fever ; the startings or spasms ; the discharge, and pain of dressing the wound, have in all been slight. There has not been a necessity to remove the dressings on account of hæmorrhage, in a single instance ; nor the smallest exfoliation,

liation, except in the case of Mary Jones. Vid. p. 246.

AT the expiration of a month from the operation, the wound has either been perfectly healed, or less than a fixpenny piece ; in all, the wound has been ultimately cured, and the cicatrix remarkably small. (I do not include the cases, where I have operated with a flap, of which a particular account is given in this work.) Had not these cases occurred in a hospital where the practice has been made as public as possible, I should not have ventured to publish an account, which I fear but few would have credited.



credited. The operation has likewise been done in this place by others, with great success.

AT different periods of time, many of the hints mentioned in this treatise, may have been pointed out by others. It is difficult to advance any doctrine on this, or any other operation, that can claim a genuine originality. However, it is not my intention, either to depreciate the memory of the dead, or offend the sensibility of the living ; but I cannot pretend to assign to its real origin, every single hint which I have received through the course of the last

xviii P R E F A C E.

twelve years. During this period I have paid an unremitting attention to the subject, and have reason to believe, that the operation and after-treatment, as now offered to the public, have been practised with a degree of success unknown in any former period of time.

I AM much obliged to several eminent practitioners, for the communication of many useful cases, hints, &c. These I have endeavoured to dispose of in such a manner as will, in my opinion, be most conducive to the service of the public, and  
I hope

I hope give no offence to the authors.

SINCE all speculative reasoning on these subjects is very fallacious, when placed in competition with experience, it has been my aim to deduce the doctrine of this work from practice only: yet, when we consider how slowly the most valuable improvements are adopted, it must be expected that the plan here recommended, will make but a gradual advance. I must request, that those who do me the favour to adopt the practice, will execute it exactly as recommended; for every single portion

is so intimately connected with the rest, that they cannot remove one part, without danger of bringing down the whole fabric.

IF I have expressed myself in such a manner, as to enable the reader to put in practice the means recommended, I have fully attained what I aimed at. Should it be allowed that I have made a step towards the improvement of surgery, I shall be much pleased ; since it is an art, which, when practised with judgement, humanity, and honour, is an ornament to human nature ; and for its certainty in relieving many of the most  
distressful

P R E F A C E.    xxi

distressful accidents, to which all are liable, must ever be considered, as of the utmost importance to the happiness of mankind.

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# PRACTICAL OBSERVATIONS

O N

## A M P U T A T I O N, &c.

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### P A R T I.

O N T H E

### OPERATION OF AMPUTATION.

#### C H A P. I.

*On the Use of the TAPE, or  
CIRCULAR BAND.*

**M**Y deviations from the usual practice consist, first, in the mode of dividing the parts, or what is usually called performing the operation of amputation: and secondly, in the  
B after-

## 2 ON THE USE OF THE TAPE,

after-treatment. I shall proceed to give as concise and clear an account of both as is in my power.

FIRST, as to the operation, I differ in the application of the tape, the quantity of skin saved, and the manner of executing the double incision.

AFTER first viewing the sentiments of the best modern surgical writers, and considering what I have to offer, I will leave the reader to draw his own conclusions as to the propriety of each plan.

“ WHILE one of the assistants holds the leg, you must roll a slip of fine rag, half an inch broad, three or four times round it, about four or five inches below the inferior extremity of the patella: this being pinned on, is to serve as a guide for the knife, which without it, perhaps, would not be directed so dexterously.” Sharpe’s Operations, p. 226.

“ THE

“THE part is then fixed upon for making the first incision through the integuments, half an inch below which the tape is to be passed round the limb, (making several turns as tight as possible,) and to be pinned. It seems to me to be the intention of many operators, to apply this tape only as a guide for the knife, as directed by Mr. Sharpe, and to cut either above or below it, as it may happen : with this intention, they roll it round the limb loosely. Heister indeed, in his book of surgery, recommends the tape to be applied tight round the limb, in order to keep the fleshy parts close to the bone, his intention being to amputate, by carrying his incision through the integuments and muscles down to the bone at once. He likewise says that the amputation is to be made below the tape, as does Monro in the Medical Essays. The French surgeons, in their Memoirs, are likewise of the same way of thinking.

Le Dran does not apply the tape for the direction of the knife, but to keep the muscles compact and close to the bone. I must here remark, that cutting above the tape will prevent the operator from being embarrassed when he is to make his second incision, which is to go through the muscles to the bone, as the tape generally slips off, and is in the way of the knife, if the first incision is made below it. Another advantage, which arises from pulling the tape as tight as possible in passing it round the limb before it is pinned, is, that the skin will be raised from the subjacent muscles, when the assistant draws it up, which cannot be the case, if the incision is made below the tape; but, by carrying the knife a little above it, the integuments will be divided without cutting into the muscles, the patient saved from some pain, and a neatness given to the operation." Bromfield's *Chirur. Observ.*

As

As the last-named author has taken a very full view of the subject, I have been induced to transcribe the whole passage, and have been the more particular in this respect, as it likewise contains the sentiments of others. To make short of the matter, I dare venture to assert, that whether you cut above or below the tape, whether you consider it as a director to the knife, or as giving steadiness to the parts, or with whatever view you apply it, the practice may be advantageously laid aside ; as the following method appears upon trial, in every respect superior. Likewise, the mental sufferings of the patient will ever be considered by the humane practitioner, as highly intitled to his attention ; and we cannot avoid observing, that after the tourniquet is applied, every moment's delay detains the patient in a most painful state of mind, which the application of the tape greatly prolongs ; therefore, if not attended with

## 6 ON THE USE OF THE TAPE,

superior advantages, here is sufficient reason for exploding its use. Therefore, as soon as the tourniquet is applied, let an assistant grasp the limb circularly, with both hands, and firmly draw the skin and muscles upwards; the operator must then fix his eye upon the proper part where he is to begin his operation, and he will now make the circular incision through the skin and adipose membrane, with considerable facility and dispatch, as the knife will pass much quicker, in consequence of the tense state in which the parts are supported: the operator's attention likewise, not being directed and confined to cut in the exact line of the tape, he will execute this part of the operation in half the time which is required in the mode usually practised.

HENCE it appears, that the application of the tape occasions a considerable and anxious delay previous to the  
circular

circular incision ; and is also afterwards, a great obstacle to the speedy execution of it. Now as it is universally allowed, that the division of the skin is the most painful part of incisions in general, it is always proper to execute this part of an operation, as speedily as possible ; to which it may likewise be added, that by drawing up and supporting the skin and muscles as here directed, the leading objects are more fully attained ; these are, the preservation of as much skin and muscular substance, as will afterwards form a good cushion upon the extremity of the bone : I am of opinion therefore, that the use of the tape is exploded upon rational grounds.

YET I think it a respect due to those who have favoured me with their sentiments on this head, to observe ; that some eminent practitioners think the delay occasioned by the application of the tape, is of little consequence ; and

## 8     ON THE USE OF THE TAPE,

that the circular incision may be made more exact with the assistance of the tape; or in its place a slip of leather spread with sticking plaister. I have always operated without it, and I cannot say that in any case, I have experienced a single inconvenience from the want of it, nor does it appear to me, that the parts are divided in a more favourable direction with the assistance of the tape; on the contrary, I am convinced that the circular incision may be more speedily made, without the line formed by the band. It has been urged, that if you have occasion to amputate, where abscesses have broken out above the knee; you cannot make the circular incision, at an equal distance all round, without going higher up the limb than is adviseable; and likewise, that it is prudent in such cases, sometimes to make an oblique circular incision to avoid the unsound integuments, where the matter has been discharged;  
and



and that these unsound parts are sometimes so situated, that you cannot see them as you carry on the incision; but the inclination of the tape affords you a proper direction, and enables you to save as much sound skin, as is possible. Where matters are thus situated, my practice of late has been, previously to the operation, to mark out the line where the knife is to pass, with ink or some coloured liquid; and to operate with a less knife, than that used in common amputations: a catlin of a moderate size answers the purpose very well, is more handy, cuts with either edge as a turn of the hand directs, and acts more under the immediate view of the eye than a larger knife. Having communicated most of the hints received from others, interspersed with the line of practice I have adopted, every individual will take that method, which his own judgment dictates, and the peculiar nature of each case seems to require.

## 10 ON THE DOUBLE INCISION.

quire. In a subsequent account from the Gentleman, who favoured me with many of the foregoing hints, and of whose candour and judgment I have a high opinion, I am favoured with the following passage. “ I am inclined to think, that the tape is generally useless : a circular mark made with ink, is often of use. A thread wet with ink may be put round the limb in any direction in a few seconds ; this will leave a mark that may be of use.”

### C H A P. II.

#### *On the* DOUBLE INCISION.

THE double incision, as advised by all the best surgical writers, and at this time generally practised ; is, I am convinced, capable of considerable improvement ; as will evidently appear to every unprejudiced person, that will take a candid view of the subject ;

## ON THE DOUBLE INCISION. II

subject; and this will be the most effectually accomplished, by considering the precepts of the best writers; and comparing them with the reason and experience, which I shall afterwards present for their consideration.

“THE ligature being made, according to custom, with Mr. Petit’s tourniquet to stop the blood, and the limb being supported by two assistants, I made a circular incision through the skin and muscles, with the crooked knife: then ordered them to be drawn upwards, by the assistant who embraced the superior part of the arm, I began the circular turn again with the knife, even with the wound, cutting a second time to the bone, which I sawed off even with the flesh.” Le Dran’s Surgery.

“THE course of the blood being stopped, you must begin your incision  
just

## 12 ON THE DOUBLE INCISION.

just below the linen roller, on the under part of the limb, bringing your knife towards you, which at one sweep may cut more than the semicircle; then beginning your second wound on the upper part, it must be continued from the one extremity to the other of the first wound, making them but one line. These incisions must be made quite through the *membrana adiposa*, as far as the muscles, then taking off the linen roller, and an assistant drawing back the skin, as far as it will go, you make your wound from the edges of it when drawn back, thro' the flesh to the bone, in the same manner as you did through the skin." Sharpe's Operations, p. 227.

“ As soon as the tape is thus applied, the tourniquet is to be screwed tight: the circular incision through the integuments being made by the dismembering knife, if any little parts  
of

of the integuments still adhere to the muscles, they should be set at liberty with the point of it, so as that the skin may slip easily over the muscles. The assistant must then draw up the skin as high as possible, which the operator may assist with his fingers. The knife is then applied close to the edge of the integuments thus drawn up, and carried quite through the muscles down to the bone, in a circular manner as before." Bromfield's *Chirur. Obs.* vol. I. p. 150.

LE DRAN, after the circular incision, directs the skin and muscles to be drawn upwards; he then cuts through the muscles, down to the bone. Sharpe, after the circular incision, directs an assistant to draw back the skin, as far as it will go; and to make your wound from the edges of it when drawn back, through the muscles down to the bone. Bromfield's advice is more judicious,  
and

and agreeable to the practice of the most eminent operators of the present day: his words are, “after the circular incision, if any little parts of the integuments still adhere to the muscles, they should be set at liberty,” &c. Now if we act even agreeably to the advice of the last-named author, it is extremely uncertain what quantity of skin we shall save, in some subjects more, and in others less, for in some the cellular and ligamentous attachments will yield more readily than in others, and where an inflammation, or previous suppuration, has taken place in the neighbourhood of the incision, by which adhesions are formed, the parts will not retract: however, it is certain not any of them saves either a sufficient, or determinate quantity; by a sufficient quantity, I mean as much as will, after the operation is finished, fully cover the whole surface of the wound with the most perfect ease;  
for

for on an attention to this point a speedy cure principally depends. Bromfield's advice is, "to draw up the skin as high as possible; but gives us no exact direction, as to the quantity of skin we ought to preserve. Directions, "to draw the skin upwards," "as far as it will go," "as high as possible," &c. does not determine the quantity proper to be saved; therefore, it remains for future experience to decide, what quantity should be saved to produce the most speedy cure.

AFTER you have made your incision through the skin and adipose membrane, as advised in the foregoing directions on the use of the tape, let the assistant still continue a steady support of the parts, then separate the cellular and ligamentous attachments with the point of your knife, 'till as much skin is drawn up, as will with the united assistance of the particular division of the muscles  
hereafter

## 16 ON THE DOUBLE INCISION.

hereafter recommended, fully cover the whole surface of the wound with the most perfect ease; and that this may always be certainly executed, I have fully experienced in a considerable variety of cases.

THE next deviation from the usual mode of operation, consists in a different division of the muscles. "The knife is then applied close to the edge of the integuments thus drawn up, and carried quite through the muscles down to the bone, in a circular manner as before." Sharpe. It would be useless to produce any other quotation upon this point, as the direction is similar to that of all the best writers, and exactly what is practised by most operators at the present time. Although a speedy cure may be produced, by covering the wound with skin and adipose membrane only, yet it will appear, that the after consequences are of very material importance



portance in the thigh-amputation ; and hence the following deviation well deserves your attention, for the parts thus divided form a thicker cushion over the bone, are much better adapted for immediate contact, union, and the formation of a regularly surfaced stump : therefore, after the advised separation of the cellular and ligamentous attachments to the necessary extent, instead of applying the knife close to the edge of the integuments, and dividing the muscles in a circular perpendicular manner down to the bone, let it be done as follows : we will suppose you are operating upon the thigh, and that you stand on the outside the limb, apply the edge of your knife under the edge of the supported integuments upon the inner edge of the vastus internus muscle, and cut obliquely through that and the adjacent muscles, upwards as to the limb, and down to the bone, so as to lay it bare about three or four fingers  
C breadth

breadth higher than is usually done, by the common perpendicular circular incision, now draw the knife towards you, then its point rests upon the bone, and keeping the edge in the same oblique line already pointed out by the former incision, the rest of the muscles are to be divided in that direction all round the limb, the point of the knife being in contact with, and revolving round the bone through the whole of this division.

THE speedy execution of the above directed incision will be much expedited, by one assistant continuing a firm and steady elevation of the parts, and another attending to preserve the skin from being wounded, as the knife goes through the muscles at the under part of the limb : it may not be useless to observe, that many practitioners when they are thus far advanced in the operation, now proceed  
to

to deprive the bone of its periosteum, to a considerable extent above and below the part where the saw is to pass, and this they do so minutely, as to consume a considerable time in its execution, which appears to me not only an unnecessary delay, but injurious to the cure: it is certainly sufficient, to denude the bone in the line where the saw is to pass, and there only; this, which is all that reason and good practice can require, may be done with almost a single move of the knife round the bone.

AN important use of the periosteum is, "To keep in due order, and to support the vessels in their passage to the bones." *Monro's Osteology*. What step therefore can we take, more likely to produce suppuration, and exfoliation, than destroying this membrane, above the part where the bone is to be divided by the saw: Is not this the most probable step to destroy the circulation upon the

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surface

surface of such bone, and consequently produce the above-mentioned evils? Instead of this practice, first apply the retractor as advised by Gooch and Bromfield, then denude the bone at the part where you intend the saw to pass, and you will now saw it off higher than is usually practised, which is a considerable advantage, and coincides with the intention that we profess to keep in view thro' the whole operation, viz. to prevent a projection of the bone, and form a small cicatrix.

I HOPE I have now expressed myself in such a manner, as to be perfectly understood; and am sorry to observe, that formerly, I was not sufficiently explicit upon my manner of making the oblique division of the muscles. It was reasonably supposed from my own description, that after having laid the bone bare with the center of the edge of the knife, I continued to take  
out

out the muscles all round the limb with the same part of that instrument; now in fact, I did this chiefly, with the point of the knife; and am well aware of the difficulty of executing this part of the operation, as before described, without taking a piece out from the integuments on the under part of the limb.

A STUMP formed in the thigh, agreeably to the foregoing plan, if you bring the parts gently forwards after the operation, and then view the surface of the wound, may in some degree be said to resemble a conical cavity, the apex of which, is the extremity of the bone; and the parts thus divided, are obviously the best calculated to prevent a sugar-loaf-stump.

## C H A P. III.

*On the LIGATURE of the ARTERIES.*

AFTER having given a full description of the deviations in the mode of performing the operation, I should in prosecution of the proposed plan, immediately proceed to the dressings, but shall first offer a few remarks, which are of the utmost importance, and if not observed, may in a material degree frustrate our plan of operation, and after-treatment; by preventing what we have in view through the whole:—an union of the parts by the first intention.

Now although this proposed union of the whole wounded surface, cannot be compleatly effected, yet it will take place considerably, and more so than those who have not practised this method,

thod, will perhaps conceive at the first view. I am sorry to observe that this passage, or the whole doctrine of the work, has been so misconstrued, that it has been supposed by some, when the stump is opened at the first dressing, it will be found nearly healed ; hence a delay of dressing, injurious to the cure, has been practised : I never have, or meant to assert any thing more than follows : A considerable portion of the internal surface of the wound will actually unite immediately ; and after the sup-puration of the rest is compleat, the parts are left so nearly in contact, as to favour the speedy secondary union, of that which remains disunited.

THAT these important advantages may not be frustrated, it is of the utmost consequence, that the vessels be not taken up with the needle and ligature in the old method, where the artery, veins, nerves, and some of the

adjacent parts, are all included in the ligature; this must ever be productive of larger inflammation, tension, and consequent suppuration. Nay some operators, where the vessels are numerous, include so much of the whole muscular substance of the stump, that we may reasonably expect, nearly a superficial gangrene of the whole muscular surface; besides the violent spasms, which are the more immediate consequence; to which may be added, the firm hold given to the ligatures, which frequently renders their separation very tedious: all these are obvious obstructions to the desired union. When the arteries are drawn out with the tenaculum, and tied as naked as possible, it will be attended with very little pain at the time, and as little subsequent trouble or interruption to the speedy union of the parts. As to the comparative security from hæmorrhage, it is almost superfluous to add  
my



my testimony, after what has been advanced by several modern writers, did not many operators of the first rank still continue the old method : so much are we influenced by prejudice and habit, and so slowly are the most important improvements adopted : therefore, I shall take this opportunity to observe, that the tenaculum has been used in our hospital many years, and if success be allowed to be a proof of the propriety of this particular mode of practice, it will clearly appear in the sequel of this work, that this instrument merits every recommendation given by its most sanguine advocates.

## PART

## P A R T II.

## C H A P. I.

*On the* AFTER-TREATMENT.

**A** GREEABLY to the foregoing plan, we shall first take a view of the directions given by the best surgical writers, upon this subject.

“ You must apply loose dry lint to the wound; or in case the small vessels bleed plentifully, you may throw a handful of flour amongst the lint, which will contribute to the more effectual stopping up their orifices: before you lay on the pledget, you must bind the stump, and begin to roll from the lower part of the thigh, down to the extremity of the stump. The use of this roller is to keep the skin forwards, which, notwithstanding

withstanding the steps already taken to prevent its falling back; would in some measure do so, unless sustained in this manner." Sharpe, p. 230.

"As pain is a dreadful symptom indeed, and productive of much mischief even after an operation is perfectly well performed, the utmost attention is required, to prevent or remove it; and, for this consideration strait circular bandage should be avoided, to which, from the interruption of the circulation of the blood, may justly be ascribed not only pain, but many of the most threatening consequential symptoms. A very little reflection will sufficiently convince us of the absurdity of this practice, and that, instead of preventing, it tends directly to increase the hæmorrhage, as has been demonstrated by Professor Monro, one of the greatest men of the age. Soft lint, evenly applied, a plaister or pledget spread with  
unguent.

unguent. tripharm. cerat. alb. or something of this nature, confined with slips of common plaister, as has been directed, and a knitted woollen cap, will be found dressing and bandage sufficient, in whatever limb amputation is performed; which readily yielding to the distention of the vessels, upon the increased power and velocity of the blood, will allow a more free and uninterrupted reflux; consequently less pain, fever, and inflammation will ensue, and a quicker digestion of the wound, without so much offensive gleet, as I have observed. Hence we may reasonably infer, that the patient's life will be less exposed to danger, if strait bandage be omitted in amputation." Gooch's Surgery, vol. II. p. 335.

BROMFIELD, in his Chirurgical Observations, vol. I. p. 172, after having described the operation, adds, that "to reap the advantage of the double

double incision, the skin should be brought forward by an assistant, and retained with a circular roller ;” but immediately gives us the following passage, which is a direct contradiction to the foregoing, and leaves the reader in doubt, whether the result of the author’s extensive experience, is in favour of the immediate application of the circular bandage. We are first advised to use it, and then told, that people are too solicitous in bringing the skin forwards early, expecting it to fix immediately ; but I will give you the whole passage in his own words.

“ I THINK, in general, we are rather too solicitous in bringing the skin forwards early after an amputation, expecting it is to fix immediately ; but I have frequently seen mischief done by the tightness of the roller, when applied with this view, and abscesses  
have

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have been the consequence. When the roller is applied with this intention below the knee, still greater caution is necessary, as the edges of the sawn end of the tibia, by the pressure of the bandage, have made their way through the integuments; therefore, we should always, in thin people, lay a compress of tow or cloth on each side of the tibia, sufficiently thick to prevent the roller from pressing too tight on the bone, when we come to pass its circles round the lower edge of the stump, and when the skin is well supported by the last circle of the roller, we should pin the end there." Bromfield's Chirurg. Obs.

HENCE you see, that whether a circular bandage should be applied immediately after the operation, or you are to wait 'till the inflammatory state of the parts is abated by a kindly digestion of the wound, are points which remain

main totally undecided by practitioners of the first rank. If you apply a circular linen-roller sufficiently tight to detain the skin forwards, as it will not yield to the subsequent inflammatory tension of the parts, it must consequently often occasion all the disagreeable symptoms, related by the foregoing judicious authors. Hence from their own account of this treatment, it is clearly apparent what injury has been occasioned, by the use of the common circular bandage after amputation : indeed they have given us a most striking picture of the mischief brought upon those who have been treated in this way ; it is therefore no wonder, that many have been so prejudiced against this mode of treatment, as to lay it totally aside.

IN the year 1770, I fully and attentively considered all I had seen and read upon this subject : I had frequently  
observed,

## 32 ON THE AFTER-TREATMENT.

observed, that notwithstanding the advantage of the double incision as usually practised, high inflammation, large suppuration, exfoliation of the bone, a tedious cure, and in the thigh particularly, retraction of the muscles, and a sugar-loaf stump, or an incurable wound, was generally the consequence of the common mode of amputation ; and this, even when the business was conducted by men deservedly of the first eminence in the kingdom.

IF we do not apply the roller until digestion is formed, it clearly appears from experience, that it comes too late to prevent these evils, or answer any important purpose. When the parts to some distance from the surface of the stump have all been in a state of inflammation, the cellular membrane or connecting medium, which in a state of health, (that is, immediately after the operation,) is capable of considerable



derable elongation, is now so altered by the inflammation it has undergone, and the consequent suppuration and dissolution of its texture, to which may be added the new formed adhesions to which all membranous parts in a state of inflammatory exudation are peculiarly liable, that it is deprived of its yielding power. As a proof of this, attempt to draw the skin forwards after the inflammatory stage, and you will find the adhesions so compleat, that the cellular membrane will scarcely yield in the smallest degree, and this more particularly near the extremity of the stump, where the inflammation has been the most considerable ; hence at this part during your attempt, the edge of the skin tucks in upon the surface of the wound, and the cellular membrane will give way, only gradually, by being firmly retained in this posture, with the assistance of a firm circular bandage. The surgeon, therefore, will

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be

be much disappointed, if he expects to bring the skin forwards in any considerable degree, by applying his bandage at this period ; and the patient will suffer pain during its application, and for some time after ; occasioned by the adherent, tender, and newly connected parts being lacerated, or supported upon the stretch.

THE following inferences, appeared fairly deducible, from the foregoing considerations.

FIRST, that the adhesion, a constant consequence of the inflammation, is a most urgent reason, why the skin ought to be brought forwards immediately after the operation : that it may become fixed by that adhesion.

SECONDLY, that if this could be effected by any means which would not increase the inflammatory tension, and the  
the

the other disagreeable consequent symptoms; an important point would be gained.

THIRDLY, a bandage capable of supporting the parts in a fixed position, and easily yielding to the subsequent inflammatory tension, appears to be the desideratum.

I NOW reflected, that in some very painful cases of fractured ribs, the parts are firmly supported by a flannel-bandage; and that this easily adapts itself to the alternate motions of the chest, being of a soft, yielding, elastic nature; and hence it might fairly be inferred, that a bandage made of the same materials, is the best calculated for a useful circular one after amputation.

## C A S E I.

**I** Had at this time a patient in the Infirmary, with a white swelling in the knee ; he came from the country to have the limb amputated. Being a young operator, and hence more particularly desirous of success, I was led to the foregoing reflections, which ended in a determination to use the flannel circular bandage immediately after the operation, and to watch it attentively, that if it occasioned more pain than usual, it might be immediately removed.

THE circular incision was made as near as possible to the diseased joint, through the skin and membrana adiposa down to the muscles ; these parts being firmly drawn back by the hands of an assistant, the cellular and membranous attachments yielded so considerably, that  
rather

rather more skin was saved than usual ; the muscles were divided by a perpendicular circular incision ; and the bone in the common manner.

AT this time, I was not aware of the propriety of saving as much skin, as would afterwards easily cover the whole surface of the wound ; and consequently did not divide the cellular and membranous attachments in that free manner, which I soon found necessary to practise, and now, conjointly with the oblique division of the muscles, so urgently recommended.

UPON slackening the tourniquet a number of vessels discharged, the muscular branches appeared uncommonly large, and it was thought necessary to tie thirteen arteries at the time of the operation : the skin was now brought forwards over the extremity of the stump, and retained there by an assistant ; a

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### 38 ON THE AFTER-TREATMENT.

circular roller made of swan-skin flannel, was passed round the body, and carried also two or three times round the upper part of the thigh, where it formed a sufficient basis for the support of the skin and muscles; it was then brought forwards in a circular direction to the extremity of the stump. Although the roller was not drawn tight, it appeared to support the parts sufficiently, and very much to my satisfaction.\* I then used dry lint upon the bone and surface of the muscles; but the edge of the wound was dressed with pledgets, spread with a soft digestive ointment.

THE operation was performed at eleven o'clock in the morning, and the patient continued as easy as usual, till five in the afternoon; when the stump

\* I now find, that the flannel most proper on this occasion, is not the finest swan-skin; but the finest Welch flannel.

bled so fast, that it was necessary to remove the dressings ; two arteries discharged very fast, which had not appeared before ; they were now drawn out by the tenaculum, and tied. I was much hurt with the sufferings of the poor patient, when the lint which had formed a firm adhesion with the surface of the fore, was separated ; he declared he felt more from this, than any part of the amputation. After having tied so many vessels, I considered him as in very little danger of a returning hæmorrhage, and saw the folly of dressing with dry lint, which I never afterwards used ; it being evident, that if it were desirable to prevent the adhesions of lint to the edges of the fore, it was as much so to prevent this upon the surface : I therefore reapplied the bandage, and instead of the dry lint, placed the skin over the surface of the

wound as far as it would go, and dressed the whole with digestive pledgets.

UPON the fourth day after the operation I changed the dressings, which all separated with the most perfect ease ; the discharge was very small, the skin remained over the wound exactly as I had left it, and the whole was in a very favourable state respecting inflammatory tension.

IN short, the skin had formed such adhesions, as fixed it where it was placed ; the discharge was uncommonly moderate through the whole cure ; and by continuing mild dressings and the bandage to support the parts, the stump was perfectly healed in twenty days. The cicatrix was in the center of the stump, and so small as to be perfectly covered with a shilling ; and as the old skin formed so considerable a portion of the extremity of the stump,  
and



and there had been so small a waste of the adipose and cellular parts, in consequence of the small degree of suppuration ; the whole looked very plump, and formed the best cushion to walk upon I had ever seen.

THE linen circular bandage, as recommended and used by many immediately after the operation, had been laid aside in this hospital, till digestion and an abatement of the inflammatory symptoms had taken place ; and this practice was agreeable to the opinion of a very experienced practitioner, for whose judgment I had a great respect ; so that it was with difficulty I could reconcile myself to a trial of the flannel immediately after the operation : however, after this trial I began to think the practice of surgeons erroneous, in not attempting to bring the skin forwards immediately after the operation, that adhesions might take place ; and  
likewise,

likewise, that the application of dry lint dilated the surface of the wound, caused great irritation, and consequently, large serous discharges, and afterwards great suppurations; that this was going contrary to nature, which is most successful in restoring diseased parts, when the least interrupted by art: therefore, from this time I always applied the circular bandage, and never teased the wound with dry lint, seldom applying any dressing, but the digestive pledgets; except when small vessels bled; which were not so large as to require the ligature; I commonly restrained these with light dossils of lint, dipped in ol. olivar. et ol. terebinth. p. æ. which always separated at the first dressing.

FROM this time neither hæmorrhage, a large suppuration, an unhealed wound, or death, has followed any amputation I have since performed.

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MESSIEURS Park, and Lyon, my colleagues at the Infirmary, immediately pursued this plan ; and to their accuracy and attention the public are indebted, for a more extensive trial of the bandage.

AFTER the introduction of the flannel-roller, the use of intermediate dressings was, in a great measure, excluded ; the parts, which were brought into contact, healed by the first intention. The design of omitting all intermediate dressings was suggested by Mr. Lyon to Mr. Park, and he was the first who placed the skin in a line, on the face of the stump, with the view of uniting the whole, by the first intention.

IN Mr. Bromfield's Chirurg. Obs. you will find the following passage,  
 " The proper dressing is dry lint to the bone, then a circular piece of  
 old

old holland, to lie within the skin on the muscles, which is of great service, as the rest of the dressings will come off easily, when this is taken hold of; dry lint should be applied on this piece of linen, to fill up the cavities in the stump; and in case the small vessels should weep, a little flower may be thrown on the bit of cloth, on the next layer of lint, which may also be assisted in its compression, by applying a soft bolster of tow on the lint. Small pledgets of the digestive ointment spread on lint, should be made use of to the edges of the stump, which will prevent the sticking of the dressings."

THE interposition of a piece of old holland is certainly a rational and judicious improvement: but if the cavities are to be filled up, and flour, with compression, added; great irritation

tion and dilatation of the wound will certainly be the consequence.

DRY lint appears to be a neat and convenient dressing for fresh wounds, as it has a power, particularly when assisted with gentle pressure, of speedily suppressing the bleeding from all the small vessels; but I shall principally confine myself to a few observations upon its effects, as a dressing after amputation; from which the reader may draw his own conclusions, as to the propriety of applying it in other cases, where the parts have been recently divided. Vid. Case XXIII, XXVI, and XXVII.

WE cannot after every operation, be too anxious to remove all impediment to union; the parts should be placed in contact, without the interposition of dry lint, or any medium, which may either from its particular  
property,

property, act as a stimulant; or prove such mechanically; always remembering, that stimulus is the mother of inflammation, which is the prelude to suppuration. I have experienced the propriety of this treatment after lithotomy, castration, the operation on the bubonocoele, and many other important surgical operations; and have consequently procured a considerable degree of union by the first intention; a salutary result from the application of our dressings externally to the wounded surface; so powerful is nature in restoring recently divided parts, when not interrupted by art.

IN some operations we are under the disagreeable necessity of removing a diseased portion of skin, for example, in the extirpation of many kinds of tumors; here likewise the adherent dressings should be avoided, and a preference given to the method explained

plained and practised in case the XXIV and XXV.

BUT to reconsider the treatment after amputation: whether the skin be brought forwards and retained by a circular bandage, or otherwise, the application of dry lint will always be a considerable hindrance to a speedy cure; for though it do not possess an innate stimulant quality, yet it acts as such in a great degree, when considered in a mechanical view: it is the most proper application we have to keep wounded parts dilated, for it always adheres to them, and when wet with the discharge is expanded by the retained moisture like a sponge, and if confined by a roller to a certain extent, and moreover counteracted by an external circular bandage, you may easily judge what will be the consequence of this dilatation and pressure, and how certainly pain, inflammation,

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flammation, and large serous discharges are occasioned by filling the cavity of an abscess with dry lint after you have opened it by incision.

As the lint first adheres, and then expands, after it is applied to the extremity of a stump, hence will arise spasms, from the nerves being irritated; and from the same cause acting upon the extremity of the vessels, we can likewise account for the large serous discharges from the whole surface, and often a violent hæmorrhage from the larger vessels. If we consider the effects of whatever proves stimulant, applied either to the surface of the body, or upon the extremities of the nerves in wounds, we shall not be at a loss to account for the high inflammation produced by the above treatment. Irritation may be considered as the principal cause of inflammation. By stimulus an increased circulation is  
excited,



excited, hence fluids are urged into vessels contrary to the usual laws of the circulation ; and consequently produce heat and distention, the characteristics of inflammation. That this is the real state of the matter, relative to the usual treatment after amputation, I am as well convinced as I possibly can be, by attentive and repeated observations.

WE will suppose all to go on as well as usually, 'till the third or fourth day after the operation; when you will find the whole surface of the wound considerably enlarged; the edge of it thickened and inflamed; and a large ferous offensive discharge. You are not able to separate much of the lint, which has formed so firm an adhesion, as a large suppuration only, continued for several days can easily remove: (Vid. Case XXIII.) I am well convinced that most of

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the

the matter which forms in cases where the parts are so treated, is in consequence of the irritation of these dressings, with which the wound is so injudiciously stuffed and loaded, even by many of our most eminent surgeons.

As the matter which remains in the adherent lint from day to day, must consequently increase in acrimony; hence, by its stimulus, not only the wound, but the whole system is disordered, and often a previous hectic nourished by what is absorbed; or in conformity to a more modern theory, we will say, by the great loss of matter, and the irritation of the wounded part: and this is not the whole inconvenience, for its topical influence upon the bone is such, as to make exfoliation, a frequent consequence of such treatment.

NOTWITHSTANDING the advantage of the double incision, and the treatment

ment of the parts as now actually practised; a great discharge, exfoliation, a large cicatrix, and a sugar loaf stump, often follow.

THAT this is not an ideal picture, but a real description of what the author has frequently seen, during a particular attention to forty-six patients treated in this manner; those who continue such treatment will readily admit.

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## C H A P. II.

*The Method of Operation and After-treatment, recommended by the Author, more particularly explained.*

WE will suppose you are to operate upon the thigh; apply the tourniquet in the usual manner; stand on the outside the thigh; and let an

## 52 THE METHOD OF OPERATION, &c.

assistant draw up the skin and muscles, by firmly grasping the limb circularly with both hands; the operator then makes the circular incision, as quickly as possible, through the skin and membrana adiposa, down to the muscles; he next separates the cellular and membranous attachments with the edge of his knife, 'till as much skin is drawn back, as will afterwards, conjointly with the following division of the muscles, cover the surface of the wound, with the most perfect ease.

THE assistant still firmly supporting the parts, as before; apply the edge of your knife upon the inner edge of the musculus vastus internus, and at one stroke cut obliquely through the muscles, upwards as to the limb and down to the bone; or in other words, cut in such a direction as to lay the bone bare, about two or three fingers breadth higher than is usually done  
by

by the common perpendicular circular incision : now draw the knife towards you, so that its point may rest upon the bone, still attending to keep it in the same oblique line, that the muscles may be divided all round the limb in that direction, by a proper turn of the knife ; during which, its point is kept in contact with, and revolves round the bone.

THE part where the bone is to be laid bare, whether two, three, or four fingers breadth higher than the edge of the retracted integuments ; or, in other words, the quantity of muscular substance to be taken out, in making the double incision, must be regulated by considering the length of the limb, and the quantity of skin that has been previously saved, by dividing the membranous attachments.

#### 54 THE METHOD OF OPERATION, &c.

THE quantity of skin saved and muscular substance taken out, must be in such an exact proportion to each other, as that by a removal of both, the whole surface of the wound will afterwards be easily covered ; and the length of the limb not more shortened, than is necessary to obtain this end. However, it is to be observed, that the more muscular substance we save by fully giving the oblique direction to the knife, (instead of dividing the membranous attachments,) the better ; for reasons that will be given hereafter.

APPLY the retractor, made of linen, or leather, as recommended by Gooch, and Bromfield, for the support and defence of the soft parts ; by which, likewise, that part of the bone where the saw is to pass, will be more completely exposed to view : and upon this exact point, and there only, the  
periosteum

perioſteum is to be ſcraped off by the edge of the knife to make room for the ſaw, with which the bone is to be divided.

AFTER the removal of the limb, let each bleeding artery be gently drawn out with the tenaculum, and tied with a common ſlender ligature, as naked as poſſible: the ligatures ſhould be cut off much longer than uſual; if this caution is not obſerved, they will afterwards be drawn within the edges of the wound.

WHEN the large veſſels are tied, the tourniquet ſhould immediately be ſlackened, and the wound well cleaned, to detect any veſſel that might otherwiſe lie concealed with its orifice blocked up by coagulated blood; and before the wound is dreſſed its whole ſurface ſhould be examined with the greateſt accuracy, by which I have frequently obſerved

## 56 THE METHOD OF OPERATION, &c.

a pulsation, where no hæmorrhage has previously appeared, and turned out a small clot of blood from within the orifice of an artery of a considerable size. A particular attention is well bestowed in making secure every vessel, that it is probable might bleed upon the attack of the symptomatic fever; for besides the fatigue and pain, to which such an accident immediately exposes the patient, the desired union of the wound is likewise considerably interrupted.

THE whole surface of the wound must always be well cleaned with a sponge and warm water, as no doubt, any coagulated blood upon its surface, or between the interstices of the muscles, would be a considerable obstruction to that desired union, which we have always in view through the whole plan.

LET



## PARTICULARLY EXPLAINED. 57

LET the skin and muscles be now gently brought forwards ; fix the flannel circular roller round the body, and carry it two or three times rather tight round the upper part of the thigh, as at this point it is intended to form a sufficient basis, that materially adds to the support of the skin and muscles ; then carry it forwards in a circular direction, to the extremity of the stump, not so tight as to press rudely or forcibly, but to give an easy support to the parts.

You are now to place the skin and muscles over the bone, in such a direction, as that the wound shall appear only a line, across the face of the stump, with the angles at each side, from which points, the ligatures are to be left out, as their vicinity to either angle directs. The skin is easily secured in this posture by long slips of linen or lint about two fingers in breadth,

## 58 THE METHOD OF OPERATION, &c.

breadth, spread with cerate or any cooling ointment; if the skin do not easily meet, it is best brought into contact by slips of linen, spread with sticking plaister; these are to be applied from below upwards, across the face of the stump, and over them a soft tow pledget and compresses of linen, the whole to be retained with the many tailed bandage, like that used in compound fractures, properly adapted in size to the limb and with two tails or slips to come from below upwards, to retain the dressings upon the face of the stump.

It is the usual custom to raise the end of the stump from the surface of the bed with pillows, which appears to me very injudicious when done to the height commonly practised; since it draws the posterior muscles from the face of the stump. I find the best direction is, to raise the stump  
about

about half a hand's breadth from the surface of the bed, by which the muscles are put into an easy, relaxed position. I am informed the patient will lie easy in the side posture, or flexed position, used in fractures; for this hint I am obliged to Mr. Freer, and likewise for his recommendation of the many tailed bandage; which appears to me much more convenient than the woollen cap, that is frequently used to support the dressings, though this seems well calculated to answer that purpose, but if not put on with particular care, the skin is liable to be drawn backwards from the face of the stump, nor can the wound be dressed, without first lifting up the stump to remove the cap.

MR. HEY has favoured me with the following judicious remarks. "I think the place of incision through the muscles, the height to which the  
skin

skin must be retracted, and the place where the bone must be sawn above the first incision, might all be reduced to determinate measures. A few experiments would enable you to determine precisely, in any limb of given circumference, how many inches the skin must be retracted, &c. and these might be measured by an assistant, during the operation, in a moment ; if he had little bits of straw, or wood marked for this purpose." These are points which every judicious and attentive practitioner will thoroughly consider ; and his determination of the proper quantity of skin, necessary to be saved, to cover the face of a stump, will be much assisted, by reflecting, that the diameter of a circle is a trifle more than one third of its circumference, but to call it one third will be sufficiently exact for our purpose. Therefore it follows, that if we perform the flap operation upon a limb,

limb, the circumference of which is nine inches, the flap required to cover this wound must be somewhat more than three inches long; and by the same rule, the quantity of integuments necessary to be preserved to cover a stump of a given circumference in any limb, operated upon without the flap, is easily determined.

If the limb be large, the division of the cellular and membranous attachments must be extended in proportion; in emaciated limbs, little more than the oblique turn of the knife to lay bare the bone sufficiently high, will be necessary for the preservation of as much skin, &c. as will cover the wounded surface; and where it is practicable, the preference should always be given to the latter method.

I now operate with a double-edged knife, or catlin, rather smaller than a  
common

common amputation knife, than which it is more handy; and being more rounded at the point than the straight-edged knife, compleats the division of the attachments and oblique section of the muscles more speedily; and in the whole operation it is an advantage, that either edge will cut by the slightest turn of the hand.

I AM fully convinced in the thigh-amputation, that the oblique division of the muscles is attended with many advantages, over the perpendicular circular incision: although in the latter, as much skin has been saved, as would fully cover the whole surface of the wound. Where the arm, forearm, or the usual place below the knee are the subjects of amputation, it is not of so much consequence whether this turn is given to the knife; since as much skin and adipose membrane may be always saved  
without

without it, as will cover the surface of the wound ; the union will as speedily take place, and the cures are equally compleat.

THE case is materially different in the thigh ; here we want a sufficient cushion between the bone and machine to be used in walking ; and consequently, the more freely the oblique turn is given to the knife, the more will the extremity of the stump be furnished with muscular substance ; and the farther will the point of bone, on which the pressure principally produces inconvenience, be removed from the surface of the machine ; likewise, a more vigorous circulation will be kept up all round the extremity of the bone and stump, which lessens the danger of exfoliation.

ANOTHER advantage attendant on the oblique turn given to the knife,  
is

#### 64 THE METHOD OF OPERATION, &c.

is the plumpness and uniformity of the parts after the cure: where the cellular attachments only are separated, and the muscles divided by a perpendicular circular incision, the skin forms a rumpled, deformed, irregular surface; and this more particularly, when too much has been saved. Vid. Case XVIII, and XXII.

I SAW one case in the thigh after the perpendicular division, where, when the parts were compleatly healed, the muscles have retracted, the extremity of the bone has in a few months wasted and become pointed, for two inches upwards; and, although covered with the old skin, the patient was not able to use any machine to assist him in walking; a strong proof of the propriety of saving muscular substance, by the oblique turn of the knife. Vid. Case XX.

MANY



## PARTICULARLY EXPLAINED. 65

MANY men of eminence are yet in the practice of including a considerable portion of the adjacent parts, in every ligature they make upon an artery; not considering the vessel as secure without it. Where this is practised, and there are many vessels tied, a partial gangrene may be expected upon the surface of this stump; at least a high degree of irritation, the mother of inflammation and suppuration, will certainly follow; how inconsistent therefore, to expect union under such opposite circumstances. Another material inconvenience, attendant on this practice, is the firm adhesion which is given to the ligatures particularly when any of the membranous parts are included, by which a constant irritation is kept up, and the cure delayed.

IT sometimes happens, that where two or more vessels are situated nearly  
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in contact, the operator is tempted to include them all in one ligature; this I always avoid, as it gives a more firm hold to the ligature, and consequently occasions a tedious separation.

As to security from hæmorrhage, I advise the young practitioner to lay aside his fears and arguments, and be directed solely by experience, the best guide in practical points. In all the amputations which I have performed in the Liverpool Infirmary, for some years past, every artery has been tied as naked as possible, with the assistance of the tenaculum, and a slender ligature drawn moderately tight; (I except a few instances where an artery has been so situated, that it could not be tied, without the assistance of the needle :) and no one will assert, that in a single instance, I have removed  
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the dressings, before the usual time, on account of hæmorrhage.

As to the line in which the wound should be closed, I always form it across the face of the stump, from side to side; the discharge in general is so small, that a dependent drain is no material object; and in the thigh we gain a very important point by this practice: if the line be formed from above downwards, when the cure is completed, the cicatrix will generally be found directly opposite to the bone; therefore, in walking with an artificial leg, the point of pressure must be upon the new-formed skin, which is an evident disadvantage: this is avoided by forming the line in the contrary direction, viz. from side to side; in which case, after the cure is completed, it will be found, that in consequence of the more powerful action of the flexor muscles, the

cicatrix is drawn downwards, and the extremity of the bone is therefore covered with the old skin; and hence in walking, the point where the greatest pressure falls, is upon this part, and not upon the new-formed skin: I have not for several years, placed the skin in any other direction, than the one here recommended, but have frequently seen it done by others.

THE most plump, uniform, and in short, the best stumps I have seen, are those where the skin has been so exactly adapted to cover the wound, that slips of sticking plaister have been required to draw together the edges of the wound and retain them in contact. Vid. Case XIII. Hence it is to be inferred, that too much skin saved is disadvantageous. The wound should be perfectly closed, to prevent the free admission of air, or the irritation

tation of dressings. We all know, that in large recent wounds, if the lips be approximated and defended from the air, they will often heal without any material inflammation or suppuration: but these almost certainly occur, if the air be not precluded. Vid. Case XXVII.

THAT accurate observer Mr. Samuel Sharpe, who attempted to improve the thigh-amputation, by the introduction of particular futures called the cross stitch, has some remarks very pertinent to our present purpose. Although his method fell into disrepute, owing to the want of assistance from a proper circular bandage, and his not saving a sufficient quantity of skin and muscular substance; yet it had its advantages: IT LESSENE  
THE SURFACE OF THE WOUND.

AFTER considering the pain he gave his patients by passing the cross stitch, he has the following striking remarks. "But, whatever be the increase of pain for the present, the future ease, in consequence of it, is an ample compensation; though, if I am not mistaken, there is still another consideration of much higher importance, than any I have mentioned, and that is, a less hazard of life; for the symptomatic fever, and the great danger of life, attendant upon an amputation, does not seem to proceed, purely, from the violence done to nature by the pain of the operation, and the removal of the limb; but, also, from the difficulties with which large suppurations are produced, and this is evident, from what we see in all large wounds, that are so circumstanced, as to admit of healing by inosculation; or, as surgeons express it, by the first intention; for,  
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in this case, we perceive the cure to be effected without any great commotion; whereas the same wound, had it been left to suppurate, would have occasioned a symptomatic fever, &c. but in both instances, the violence done by the operation is the same, whether the wound be sewed up, or left to digest."

"UPON this principle we may account for the diminution of danger, by following the method, here proposed; because, as the stitches have a power of holding up the flesh and skin over the extremity of the stump, 'till they adhere to each other, in that situation; they actually do, by this means, lessen the surface of the wound; in consequence of that, the suppuration; and in consequence of both, the danger resulting from the suppuration."

“PERHAPS, it may not readily be understood, how a wound can, by any management, be suddenly so much diminished ; but, it may be better conceived, if we reflect on what I have already intimated, in regard to the healing of a wound ; for, in this way, we accomplish immediately, by art, what requires a length of time to be effected in the other methods, by nature ; and with this advantageous circumstance, that, when the wound is reduced into so small a compass, the skin is in a looser state, than when it has not been brought forwards by the stitches ; in consequence of which, the cure will be more quickly completed ; for the looser the circumjacent skin is, the less will be the cicatrix ; and cicatrization is, by much, the slower process in healing. It appears, then, from the representation I have here given, that by this method we not only bring the wound

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to a small compass, in a less time ; but also, give it a stronger tendency to heal." And, speaking on the flap-operation, which was universally disapproved in his time, he adds. " I believe, however, that this operation has not been much practised ; though by the best information I have been able to procure, it has very little answered expectation, where it has been done ; but, when it has happened to succeed, the event has confirmed the doctrine I have laid down ; that it is not the violence done by the operation, but the effects of digestion, which excite the symptomatic fever, &c. for in these instances the cures are said to have been effected with very little danger, or trouble to the patient. Sharp. Crit. Enq.

How similar are these observations to my own ; they are a strong confirmation of the propriety of what I have

have advanced ; and a proof of the utility and great success, attendant on the practice which I have recommended.

WHEN the whole of the treatment has been agreeable to my foregoing directions, the parts are generally so free from spasms, that the use of opium is seldom requisite ; the symptomatic fever will likewise be equally moderate ; and upon the third or fourth day when you change the dressings, you will generally find, that the discharge has been so small, as scarcely to have run through them ; hence, it is not often necessary to change the circular bandage at the first or second dressing ; I rather wish to avoid it, 'till the adhesions are more complet.

By a continuance of the above simple treatment, varied as appearances indicate

indicate, the cures have generally been speedily completed.

THE first unfavourable symptoms subsequent to amputation, are spasms, and hæmorrhage. As I should be highly blameable to claim any merit, that is not solely due to the method I have recommended, it is but just to observe, that the abatement of violent spasms, is principally owing to the vessels being drawn out with the tenaculum and tied naked, as more compleatly introduced into practice by Mr. Bromfield, who most highly deserves the thanks of every well wisher to surgery, for so useful and important an improvement. Some are offended that so much praise has been thought due by me to Mr. Bromfield, for his introduction of this method of securing the arteries; for they observe, there is no originality in drawing out the arteries, to tie them. There is a  
passage

76 THE METHOD OF OPERATION, &c.

passage in Heister, from which it clearly appears, that he had the idea of uniting so large a wounded surface, as that after the amputation of the arm at its articulation with the scapula; but he did not carry it into practice.

“ You now come to the dressings of the stump, which must be made with a pledget of lint, with small linen compresses upon the ends of the divided arteries you before secured by ligature; the lower-part of the skin is then drawn upwards, and the upper-part is drawn down, together with a piece of the deltoid muscle. Though, in my opinion, it would be better to apply no pledget, or compresses to the arteries, or bone; before you have thus filled the sinus of the wound with the adjacent muscular flesh, and brought the skin well over: and, then, you may apply your pledget of lint and  
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compresses ; by WHICH MEANS THE FLESH WILL MORE READILY UNITE, AND THE WOUND HEAL SOONER, than if you interposed lint and compresses." Heister's Surgery.

I HAVE more than once read this passage, and so have others ; but I never saw the importance of it 'till of late ; when I was previously fully convinced of the propriety of his doctrine by my own experience ; and will it be inferred from this, that it is not now of importance, to adopt our mode of operation, and after-treatment ? Or will any one pretend to prove, that because Parey had first given the hint of drawing out the arteries, which had been followed by others, but totally laid aside by every surgeon in Europe, in favour of what they thought a more judicious practice ; that Mr. Bromfield has not equally benefited society, and is not as highly intitled to the thanks of the profession, as  
though

though he had been the author of the original idea ?

I MAY however fairly observe, that the spasms are certainly, in some degree prevented, by an exclusion of all extraneous dressings. An intelligent observer, of more experience than myself, attributes the absence of spasms, principally, to the mode of treatment which is here recommended, and informs me, that he has used the tenaculum twenty-two years ; but always found the limb start, after amputation : he then adds, “ Your mode of treatment, indeed, prevents spasms more than any other I have seen ; and it is pleasing to observe how easy and quiet the patients lie, when dressed in your method.”

FARTHER, as stuffing the parts full of dry lint, or even dressing lightly with it, promotes spasms, and  
dilates

dilates the whole surface of the wound, it must consequently conduce to produce hæmorrhage; and upon this point I speak solely from experience. I attended for the space of seven years to amputation, where the parts were loaded with dry lint and flower, a subsequent hæmorrhage was frequently the consequence; and I can now most solemnly aver, that in my last thirty-five amputations, I have treated the parts agreeably to the directions which I now so urgently recommend; and that I have not had a single case of hæmorrhage subsequent to amputation, which has required a removal of the dressings.

THE hæmorrhage subsequent to amputation, may not improperly be divided into two kinds, deduced from the period of time at which they occur, and their consequent danger.

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I WOULD call that the first, which follows the operation within the space of twenty-four hours ; this, I believe is often occasioned by dilating the wound with expanding and irritating dressings. It is a very distressing symptom, both to the humane operator and patient, as it requires a removal of the dressings, which have now formed a considerable adhesion to the whole surface of the wound, and the separating them from the extremities of the nerves, is more painful, than any part of an amputation ; and likewise the necessary ligature upon parts in the highest degree of irritation, is a very disagreeable business to execute, and most painful to suffer. This kind of hæmorrhage is seldom fatal, since we are commonly upon the watch, and prepared to relieve it.

THE second kind is that, which happens after the above period ; and  
a most



a most alarming symptom it commonly proves ; and has frequently ended fatally, before it has been discovered ; and consequently, before any remedy could be applied. In the common method of amputation it most frequently occurs, many days after the operation, when digestion and granulation are fully formed, and all danger of this kind is reasonably supposed to be over.

WHEN the skin is not placed over the surface of the wound, but instead of this judicious practice, the parts are dilated with dry lint ; nature, ever active to relieve herself, forms a considerable digestion and consequent granulation upon the whole surface ; by which the dressings are slowly separated, and cast off. In some habits these granulations do not prove a sufficient support to the extremity of an artery ; they are not able to resist the impetus of the circulating fluid,

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which

which consequently bursts forth, and frequently exhausts the patient, either before he is aware of his situation, or any assistance can be procured. I have known this hæmorrhage happen a month after the amputation, when all the ligatures have been cast off, and the stump half healed. Vid. two fatal cases of this hæmorrhage, in Bromfield's Chirur. Obs. vol. I. p. 307.

As I have not in my own practice met with one of these cases, where the parts have been treated as now recommended, I have reason to believe this method will prove a very effectual preventive; and every unprejudiced surgeon will be immediately convinced, that the extremities of the vessels are more effectually supported by the skin, applied over the whole surface of the wound, and the consequent union, than by keeping the parts largely open, and procuring a digestion, and in some habits,  
a soft

a soft spongy granulation over their extremities.

THE next train of symptoms subsequent to amputation, and the usual treatment, are a large discharge of matter, exfoliation, retraction of the skin and muscles; and consequently, what is called a sugar-loaf stump.

THE dilatation and irritation of the wound, occasioned by its being stuffed with dry lint, the high degree of inflammatory tension, and large serous discharge, are always consequently followed by a proportionably large discharge of matter; and this is promoted by what is retained in the lint, still adhering to the surface of the wound. Its topical effect here, is not the whole of the evil; it becomes more acrimonious, and is frequently absorbed into the habit, in a state more prejudicial to the whole

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system;

system ; and these circumstances make greatly against the patient's recovery ; particularly, where the general health has previously been greatly reduced, and the amputation performed to remove the seat of absorption, viz. parts diseased by caries and large discharges, attended with hectic fever, cough, and other symptoms of an attendant, or threatening disease in the lungs.

THE application of dry lint upon the extremity of the bone, with the consequent retention of acrid matter, and exposure to the influence of the air, I consider, as the principal causes of exfoliation, which is no rare consequence of such treatment. Sometimes, only small spiculæ separate ; but oftener, the edge or rim all round the extremity of the bone. I have seen very large portions of the thigh-bone separate ; and in one case, nearly its whole substance four inches in length. When  
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the pieces are small, and the extremity of the bone is fully covered with granulations, as they pass through, they produce pricking pains in the part, sometimes so violent as to disturb the patient's rest, attended with great foreness, inflammation, and increased discharge; in others they pass without producing the least inconvenience.

SINCE I have practised the method of operating and dressing here recommended, I have met with but one case in which there occurred the smallest exfoliation, Vid. Case XV. for by dividing the muscles as advised, and bringing the whole of the soft parts forwards, the bone is concealed, and seldom gives the least interruption to the progress of the cure.

LIKEWISE, as the cicatrix is so small, viz. only a single line drawn  
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across

across the face of the stump from side to side, the parts are sooner capable of bearing the requisite pressure, from the use of a wooden leg; for this does not fall upon the new-formed skin, which is drawn backwards by the action of the posterior muscles, as before explained. The bone being covered with a large flap of old skin and muscular substance, the wound is less liable to break out again; but in those cases, where the operation has been practised in the usual manner, there is a larger generation of new flesh and what is called skin, that will remain tender, for a much longer space of time.

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C H A P. III.

MISCELLANEOUS OBSERVATIONS *on*  
AMPUTATION ; *and the* AIR *of*  
HOSPITALS.

HOWEVER well you may have acquitted yourself as an operator, you are not to imagine, that the desired success will be your certain reward ; you are only to consider your business as half done ; and to remember, that a watchful care is requisite to give your patient every advantage, from what you have already practised : it still is necessary to employ every means, which previous experience has shown to be useful ; and requires the most accurate and tender attention, to conduct  
G 4 him

him with safety, through the different stages of the cure.

SOME preparation is generally required previous to the operation, and none is of more consequence than to obviate habitual, or accidental costiveness; which is generally increased by the necessary confinement in bed after the operation. When this is the case, it is adviseable the day preceding the operation, to give some gentle laxative; or at least, to empty the intestines, by a purgative clyster a few hours before we operate. It is well known, that fevers, even of the symptomatic kind, are much aggravated by a costive belly. Your patient will likewise be freed from the disagreeable fatigue of removal to stool, soon after the operation; and from the danger attendant on straining when costive, which has sometimes produced



duced, and always endangers hæmorrhage.

THE air in which the cure is to be conducted, is a point worthy of your greatest attention: if possible, the room should be spacious, and in an open wholesome situation. It is well known, that in hospitals which are situated in populous towns, and much crowded, the salutary influence of the air is so altered, that compound fractures, and other important surgical cases, prove peculiarly fatal; and that such fractures, &c. may almost certainly be cured in the country. A fracture of the skull, although at first productive of no urgent symptoms, when the patient is carried into a crowded city-hospital, will almost certainly be succeeded by rigors, fever, inflammation, suppuration, and a sloughy state of the dura mater, requiring the application of the trephine; and

and this is so frequent a consequence, that by many, it is thought the most judicious practice, to operate as a preventive: yet, I frequently see fractures of the skull, in a better air even when attended with some degree of depression, easily cured, especially in young subjects, without the application of the trephine; from which I have learned, not always to operate at first as a preventive, unless the symptoms be urgent; but we are not to infer from this, that the practice of those is wrong, whose situation disqualifies them for practising with similar success.

THE operation of amputation done in the country, as before described, will be followed almost certainly with a speedy cure: there the consequent symptoms are trifling; nearly the whole internal surface of the wound unites by the first intention; the sup-  
puration

puration consequently is small; and as soon as laudable, the secondary union takes place, and the whole cure is speedily compleated. This will sometimes be the happy event in crowded hospitals; particularly, if the patient have not been exposed to the subtle infection of these places, for a great length of time previous to the operation. But if I may judge, from observing the progress of wounds in a tainted air, I may venture to prognosticate on the contrary, that it will unavoidably, too often happen, that although all may seem to go on well at first, yet the slow fever will come on, the stump become sore, and painful; nay even the tendinous and cellular parts grow sloughy, and the cure be considerably retarded: yet at last all will close, and the part be healed with so small a cicatrix, as to prove that the patient still reaps the greatest advantage from our mode of operation;

tion; for the sloughs are seldom so extensive as to destroy the skin. Sometimes the whole stage here described, will be attended with little or no fever.

MANY hospitals are so tainted by unwholesome effluvia, that they are rather a pest, than a relief, to the objects they contain.

THE following regulations are humbly recommended to the consideration of those, who have the care of hospitals in want of such attention.

1. No ward should be inhabited, for more than the space of four months together; for it is impossible to keep a room healthy, that is constantly crowded with diseased people: the walls should then be scraped, white-washed, and every other necessary means used for the purification of the  
air,

air, before the re-admission of patients.

2. THE bed-stocks should be made of iron, to prevent the lodgement of vermin, and the more easy absorption of putrid matter.

3. THE bedding should be more frequently changed, than is usually done; and the bed tick stuffed with chaff, hay, cut straw, or materials of such easy expence, as to admit of their being frequently changed.

4. WHERE a hospital is conveniently situated for the purpose, all the patients that are able, should carry out their bedding, and expose it in the open air, for several hours every day, when the weather will permit.

5. ON the days of admission, those patients that have inhabited foul ships,  
jails,

jails, cellars or garrets, workhouses, or other infected places; or whose clothes are dirty, or suspected to contain vermin, before they are suffered to appear in the ward, should first be stripped, and washed in the warm bath, and afterwards clothed with proper dresses, provided at the expence of the charity; by which means the evil of importing infection, so detrimental to the salubrity of every hospital, would be greatly remedied.

6. THE dresses for the men may consist, chiefly of a clean shirt, jacket, and trousers; for the women, a shift, petticoat, and bed-gown; the rest may be supplied from their own clothing, which will easily admit of being first well cleaned.

7. THE infected clothes should be baked in an oven constructed for the purpose;

purpose; by which all vermin and infection will be destroyed; and the clothes may be returned clean to the patients, when they are discharged the hospital.

8. THE patients, when received on the days of admission, should be placed in the wards which have been last ventilated, and not in those that have been long inhabited; where it may reasonably be presumed, the air is considerably tainted.

9. ALL incurable or infectious cases should be refused admittance; and amongst these should be classed old chronic ulcers of the legs, and particularly those in which there is a great loss of substance, for these seldom remain long healed; hence most hospitals are so crowded, that the intention of the charity is perverted, as the air is rendered unwholesome.

10. ALL offensive gangrenous, or other putrid sores, should be placed in distinct rooms provided for that purpose: and not suffered to taint a whole ward.

11. THERE should be particular rooms provided for those patients, who are the subjects of operations; they should be in the most airy situation, never long inhabited, and alternately cleaned and ventilated, as before advised.

12. A HOSPITAL should never be crowded on any account; and always of so large a construction, that some part of the building may at all times, be uninhabited, for the purpose of white-washing, ventilation, &c.

13. WHEN any person has been afflicted with a putrid disease, or confined to bed for a length of time, let  
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the bed be emptied, and the bed-stocks, the bed, the sheets, and other linen be washed, and the rest of the bed-clothes exposed for some time in the open air, and baked in the oven, before they be used again.

14. LET the nurses see that every patient's hands and face are washed, every morning; and their feet, once a week.

15. LET the nurse of each ward be liable to a fine, to be deducted from her wages, if some of the windows in her ward, are not kept open, during a stated number of hours, every day.

16. To every Infirmary, particularly where the wards are crowded, a house in the country, well situated, and at a convenient distance should appertain; without such assistance many of the patients must perish, which  
H would

would be easily and certainly preserved; and it will be found, (as may without difficulty be demonstrated,) the best policy in the trustees of an Infirmary, to provide such an appendix. By such assistance patients may be speedily cured, at a small expence; but, if suffered to remain in an Infirmary, their recovery will either be prevented, or obtained in a great length of time, at a considerable expence, by the most costly drugs, nutritious diet, &c. likewise, the house will constantly be crowded with the most miserable objects, to the anxiety of those who attend them, and the exclusion of other patients, who might have been cured in the interim. Many hospital-surgeons are under the necessity of providing lodgings in the country, at their own expence, for their patients who have undergone operations; rather than suffer the pain of a disappointment  
in

in compleating a good cure, or seeing their patient languish under a hectic, incurable in a crowded Infirmary. Therefore it is hoped that these considerations will influence the humane trustees, to provide these conveniences for the poor sufferers.

BUT to return more particularly to our subject. It is of the utmost importance, that the inflammation be kept in moderate bounds after the operation, for an excess of inflammation dissolves the uniting medium. Pain and spasms, should be alleviated by opium.

IF the bloody or serous discharge from the wound have been large, and the dressings in consequence, are become dry and hard upon the extremity of the stump, their pressure must give pain, and increase the inflammation; therefore they should be gently re-

H 2 moved.

moved. If the many tailed bandage be used, this may be done without lifting up the limb; I commonly take them away on the second, or third day, and the patient generally finds great ease from this treatment.

IF the edges of the wound have been retained in contact either by the needle and ligature, or adhesive plaisters, these should now be removed if it can be easily done, or else they may be divided with the scissars, and the latter must be discontinued during the inflammatory stage, that their farther irritation may be prevented; and either the cooling repellent topics, as the Aq. veget. miner. or pledgets spread with a soft cooling ointment be applied, as the appearance of tension may indicate.

THE dressings should be renewed every day, with as much tenderness  
as

as possible; and the circular bandage re-applied very slack, as often as its foulness may require.

AFTER the inflammatory stage, when the foreness is abated, and a general state of relaxation takes place, this is the time to effect a removal of the ligatures: which is best done, by pulling at each of them, with as much force as the patient can bear at every dressing, which I have always found perfectly safe, and successful. If this be neglected, the secondary union will be much impeded, and the cure consequently protracted; for the granulations have sometimes surrounded and entangled the ligature so completely, that the greatest difficulty has attended the disengaging it. If each artery has been included in a separate ligature, or in other words, all the vessels taken up single, (which I always strongly recommend) the separation of the

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ligatures

ligatures is generally very speedy, and greatly promoted by the above treatment.

WHEN the suppuration is compleat, too much attention cannot be paid to keeping the edges of the wound in contact, by the re-application of the sticking plaister, that the secondary union may speedily take place, and as small a cicatrix as possible be formed.

I GENERALLY give the bark, during the suppurative stage ; and keep an open belly.

If the patient have been enfeebled by large discharges, it is of great importance to take him daily out of bed soon after the operation, by which treatment his general health will improve more speedily ; and without this attention, I have known  
him

T O

T H O S E   G E N T L E M E N ,

W H O   H A V E   S O   K I N D L Y   F A V O U R E D   M E

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H U M B L E   S E R V A N T ,

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P A R T    I I I .

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*On the AMPUTATION, with a  
FLAP above the ANGLE.*

**I**T is well known that the flap operation is not a modern invention; that it was first proposed by Loudham, an English surgeon, and published by Jacob Young, in 1679, in his *Currus Triumphalis ex Terebintb*: and practised with success, by several others; insomuch, that almost every succeeding writer treats on this subject, and in some cases, we are informed they succeeded very well. However, it soon fell into disrepute; probably

probably owing to their taking up so much muscular substance with each artery; to the use of fungous substances to stop the hæmorrhage, which being frequently ineffectual, many bled to death; and to the rude pressure of their machines to prevent hæmorrhage, and retain the flap in contact with the extremity of the stump. By these, pain, inflammation, and extensive suppurations would certainly be produced, which probably brought the practice into such disrepute, that it was totally laid aside for many years, by every surgeon in Europe.

MR. Charles White, in a paper dated 1769, inserted in the fourth volume of the London Medical Obs. and Inq. informs us, that he took the hint of amputating above the ankle, so as to preserve the use of the knee joint, from a case he met with

with by accident; where, at the patient's request, the operation had been done in this part by the single incision; and succeeded so advantageously, that she walked very well, with a very aukward machine. This gentleman now began to operate in this part, with the advantage of the double incision; and contrived a more convenient machine, both which fully answered his expectations.

IN 1773, Mr. William Bromfield published his Chirurgical Observations. We are there informed, that he took up the hint of operating above the ankle, as early as the year 1740, from a separation of two mortified limbs at this part; and by a machine of plain construction the patient walked so well, both on plain ground, and in going up and down stairs, that you could hardly discover she was lame. Our author at that  
time

time recommended, but never performed the operation in this part; as it was greatly disapproved of by several eminent surgeons to whom he proposed it: he therefore laid aside all thoughts of such a practice, 'till he received the history of three cases, where it had been done with success, from Mr. Wright, (at that time of Sheffield,) a surgeon of great merit. This is dated 1754; from this time we are told, Mr. Bromfield began to operate in this part with great success; "without producing the least alarming symptom from the time of the amputation, to the healing of the fore."

IN the year 1765, Sylvester O'Halloran, an eminent surgeon of Limerick in Ireland, published a revival of the flap operation, upon a plan entirely new; supported by a most ingenious train of observations and reasoning, which does  
him

him the highest credit. It is not my intention to give the reader a full account of this matter ; for this I refer him to the work itself, which is written with a high degree of merit and candour : I propose only to point out his general principles ; as I shall have occasion to observe, that in the course of my practice a more extensive union takes place, where the surface of an amputated limb is immediately brought into contact, than has heretofore been conjectured, or allowed : or in other words, that instead of dressing the flap and stump as separate fores, they may be brought into contact, and a considerable part of the wound united by the first intention ; the reverse is our author's leading principle. " Healing by inosculation without suppuration, by an immediate coalescence, or by the first intention, is merely chimerical, and is opposite to the rules of nature.

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Inflam-

Inflammation (contrary to the received canon) is not the time for a re-union of divided parts; this happy minute follows, not precedes suppuration." We are therefore directed to dress the stump and flap, as separate fores: and "about the twelfth day, then, (that is, when inflammation is entirely passed, and suppuration effectually established,) the bare flap may be turned up, against the naked stump; and so be secured by plaister, compression, and bandage." O'Halloran on Gangrenes, &c.

THIS mode of operation, although supported by a most ingenious train of reasoning and a considerable degree of success, made its way like all other improvements, but slowly.

ON a visit to Mr. Lucas, of Leeds, in July 1779, before the publication of my Practical Observations on Amputation,

putation, our conversation turned upon this subject; I related our success in common amputations of uniting by the first intention; we were both of opinion, this would take place in the flap operation. I was much pleased to see two patients walk so well, on whom he had performed the amputation in O'Halloran's method; and was fully convinced of the many advantages they had, superior to those who suffer the common operation, at the usual place below the knee; and we had no doubts, but the cure might be rendered more safe, easy and expeditious, by applying the flap, with the view of immediately uniting it by the first intention.

Soon after this time I was favoured with a letter from Mr. Charles White, dated Manchester, December 31st, 1779, from which it appears he had taken up the same ideas. "I have

something farther to propose to you on the subject of amputation, and shall be obliged to you for your opinion of it, and whether you have made any attempts of the kind. Amputations a little above the ankle joint are certainly much preferable to those a little below the knee, when you have it in your power to make your election; and give the patient many advantages, whether performed with, or without a flap: the flap, in my opinion, is much to be preferred, and would certainly receive much advantage, if it could be laid to the naked stump, immediately after the operation. This was attempted formerly, but I am not surprized at the want of success, considering the rude state surgery was in at that time; but from the many improvements that have been lately made, and from your state of facts, I am much inclined  
to



to think it would answer; but there are some points that may require consideration, viz. whether the flap, in that case, should be thick, or thin; and whether long, or short. The want of success in laying the flaps to the naked stumps immediately after the operation, put O'Halloran upon trying a different method of keeping them asunder by the intervention of lint, for ten, twelve, or fourteen days; but this increases the pain, retards the cure, and does not make it so perfect as it would be, if it was laid to immediately."

## C A S E II.

*An AMPUTATION above the ANCLE  
with a FLAP.*

NEXT the following case occurred, January 10th, 1780. ——— Murray, a healthy young man, came up to the Liverpool Infirmary for the advice of the surgeons. About a year before, he had the left foot carried off at the ankle joint, by a twelve-pound shot; the extremities of the tibia and fibula were shattered into small pieces, and the adjacent soft parts were in the greatest degree of laceration. He remained many hours almost exhausted with the loss of blood, without the least attention. The ship in which he received his wound,

wound, being then a prize to a French vessel, he earnestly intreated the French surgeon to amputate his leg, which he refused; neither would he suffer the English surgeon to operate. In this state he was carried into France, and lay in a hospital there many months, in a most deplorable state, from the irritation of splinters and a large discharge; but the strength of his constitution surmounted these difficulties.

HE had now, in place of the foot, a large, protuberant, callous substance; from the center of which was an eminence that formed a point, and this was surrounded with an incurable ulcer, it being impossible ever to form a cicatrix over this projection. The weight of the diseased substance, the incurable state of the ulcer, the impossibility of his bearing the least pressure upon this point, from any

machine to assist him in walking, and the inconvenient length of the stump upon the use of a common wooden leg, with the knee bent, were powerful arguments in favour of amputation, and determined him to undergo the operation.

He was a sensible, intelligent man ; I therefore stated the advantages and risque of the flap operation above the ankle, with as much impartiality as was in my power ; so as to enable him to determine for himself, whether he would prefer this, or the common amputation at the usual place below the knee : he chose the former.

MONDAY, February 7th, he was received into the Infirmary, and submitted to the operation immediately. The disease was in the left leg, the patient therefore lay on his right side upon a table of a convenient height,  
covered

covered with a double blanket, so as to turn the part to be first cut, fully into view. The intended line where the knife was to pass in forming the flap, had been previously marked out with ink. A longitudinal incision was made with a common scalpel, about the central part or middle of the side of the leg; first on the outside, then on the inside, and across the tendo achillis: hence the intended flap was formed, first by incisions through the skin and adipose membrane, and then completed by pushing a catlin through the muscular parts in the upper incised point, and afterwards, carrying it out below, in the direction of the line already mentioned; thus the whole flap was completed.

HENCE you see, the flap was thick; it contained the whole substance of the tendo achillis; the usual double  
incision

incision was made; the retractor applied to defend the soft parts; and the bone divided, as high as possible with the saw. Three arteries were tied, two as naked as possible, with the assistance of the tenaculum; but a third lay so contiguous to the bone, that I could not surround it without the assistance of the needle; nor was it in my power to avoid including the nerve: the flannel roller gave a gentle support to the soft parts; the ligatures were brought out as their vicinity directed, one at each angle of the wound, and the other in the center.

THE flap was placed in contact with the naked stump, and retained there, first by three superficial stitches; one in the center, and one on each side; and between these adhesive plaisters were used, first reducing the protruded adipose membrane with a probe,

probe, so as to admit the close contact of the wounded skin: the flap appeared well adapted in size to the wound.

PLEDGES of lint and tow were applied as usual, and retained with a light compress and roller. The patient was placed in bed, his whole body inclining to the diseased side, and the thigh rested on its outside, with the knee half bent; in short, he was placed in the relaxed position, used in fractures of the leg; he lay so easy, that the internal use of opium was not requisite.

A FEW hours after the operation he complained of pain in the calf of the leg, which he thought was owing to the tightness of the circular bandage; but on a minute examination, it appeared certain this was only imaginary; for the roller  
had

had relaxed so much, as to admit the fingers between it and the skin, with the most perfect ease.

THE 11th: the spasms had been more frequent than after our common amputations, where the nerves are not included in any ligature; he had not slept much, but attributed the want of it to his being in a strange place: the symptomatic fever was very moderate.

THE 12th: had been very free from pain; the fever inconsiderable; two stools were procured by a glyster: as a thin bloody serum had made the dressings hard, I removed them; the inflammatory tension was moderate; the parts had a very favourable aspect as to the union; the cooling repellents appeared to me the most judicious applications; therefore, the wound was covered with cerate pledgets, and  
the



the whole extremity of the stump with linen compresses, moistened in Aq. Veget. min. used cold.

THE 13th: doing very well; the symptomatic fever gone; some appearance of matter from the edge of the wound; the dressings as before: omit the saline draughts which had been given during the inflammatory stage, and take Pulv. Cort. Peruv. ʒij *tèr die.* procure stools occasionally.

THE 14th: the discharge larger, but moderate; the angle and edges of the wound on the outside the leg, which lay next the bed, and consequently were pressed upon, perfectly united; the upper angle, or that on the inside the leg, more open, and evidently the part where nature had directed the whole discharge; which, I believe came solely from the adipose membrane. The inflammatory stage  
now

now perfectly over, and the union of the whole flap compleat; the futures of the skin being loose and useless, were removed. This day the ligatures were alternately drawn out, and supported upon the stretch, as long and as forcibly as the patient could bear; that which was placed out at the inner angle separated, and was totally removed; the central one in which the nerve was included, gave him the most pain when touched; and during the attempt, threw the muscles into spasms.

THE 15th: the ligature at the outer angle separated: in every respect doing well: the wound treated as before.

THE 16th: greatly altered for the worse; he had a dry tongue, quick pulse, cold clammy sweats at times; the discharge appeared larger, more thin and acrid; and the edge of the  
fore

fore inflamed, ragged, corroded, and in some parts sloughy: in short, the whole had that tendency to a putrid spreading state, well known to those who attended this house; which turn the fores had frequently taken for some time past.

THE 17th: last ligature separated; appearance of the stump more unfavourable; the patient restless, has frequent tremors and twitchings, his thirst constant, tongue dry, and pulse one hundred and twenty in a minute. Hence I was confirmed in the opinion, that he was seized with the infection of the house; that the fore would become gangrenous, and the whole flap be separated, if this disposition could not be speedily checked. As the bark had not efficacy sufficient to prevent the disease, I did not expect much from it in the cure; I therefore substituted the saline draughts  
every

every three hours; but expected the most advantage from a removal of the patient out of the hospital. The weather being moderate, this was done immediately, to a part of the town that is airy, and but thinly inhabited. Here he had first clean linen, and was then put into a well-aired, clean, comfortable room; the clothes which he carried out from the hospital had a peculiar fetor, that was very disagreeable to his friends: they therefore hung them in the open air for several days.

THE 18th: passed a better night; pulse ninety-six; wound rather easier.

THE 19th: a much better night; stump easier; discharge less, and not so thin and acrimonious. From this time all went on well; the wound soon became clean, and the soreness left him, for the flap still firmly adhered; a kindly digestion, and the  
second

second stage, or that of relaxation, soon took place. I now re-applied the sticking plaister to approximate the lips of the wound; and returned to the use of the bark as before; and so expeditious was the cure, that at the end of three weeks from the date of the operation, the whole was healed, except half an inch in length at the inner angle where the principal vent had been; here there was a spongy fungus, from which run a short superficial sinus. In another week the wound was reduced to a spongy excrescence, about the size of a split pea, this I consumed with the caustic, after which it healed in a few days. The knee joint had contracted a considerable degree of stiffness, from its remaining so long in the same position, and it was several weeks before this could be perfectly removed.

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THAT the spreading state of the fore may be the better understood, it is necessary to observe, that for some time past, a putrid infection had been generated in our Infirmary, owing to a bad constructed building, a crowded house, and other concurrent causes. This principally affected those who had ulcers; patients received here, with a fore in a kindly state, became sometimes affected in a week; one single point of the ulcer forming a dark brown slough, which by degrees would extend all over the ulcer; the discharge thin, large, and offensive; in time the whole cast off, and a kind surface succeeded; and before the fore could heal, the same appearances would return; and this was the case, repeatedly, in the same patient. In some the pain was violent, and required large doses of opium to procure even the least relief; others, although the ulcers  
 had

had a most disagreeable aspect suffered but little. In some the feverish symptoms were inconsiderable, and the general health scarcely affected; others were seized with rigors, succeeded by heat, thirst, slow fever, languor, and frequent cold sweats. But little apparent advantage was gained, either from any particular external application, or internal medicine. I used fumigations, fomentations, poultices of carrots, bark, and various antiseptics, externally; bark, acids, malt infusion, and every internal medicine that promised the least prospect of success, were likewise fairly tried, internally. Some of my patients used the fixed air, both internally and externally, in the fairest manner; neither did this, or any other means do much good, while the patients remained in the house.

It seemed to me, that the sores would spread to a certain degree, notwithstanding every means; and when the constitution had freed itself by the discharge from the ulcers, they grew better; and if the patient were suffered to remain long in the house, he became again tainted, and the sores spread as before. All these did well, soon after they were removed into a better air. By an alteration in the structure of the building, and other salutary regulations, this evil is considerably remedied.

In this infected state of the house, I reluctantly attempted the flap operation: although I placed him in a room detached from the rest of the wards, yet he did not escape the infection.

This operation was done in presence of several of the medical faculty,  
besides



besides those who attend the Infirmary, and was examined by them frequently during the cure; after which I had the pleasure of shewing the patient to Mr. Edward Hall, of Manchester, and many of my medical friends. The cicatrix was a narrow line, no broader in any part, than a split pea; the man was soon able to use an artificial leg, with which he walks remarkably well. He has been several voyages to sea, and done his business with great activity. He bears the pressure of the machine, totally upon the end of the stump, and has not been troubled with the least excoriation or soreness.

## C A S E III.

*An AMPUTATION above the ANGLE  
with a FLAP, related by Mr. JAMES  
LUCAS, Surgeon to the INFIRMARY  
at LEEDS.*

OCTOBER 19th, 1780, I was favoured with the following account from Mr. Lucas. “I have recommended the immediate application of the flap, in a consultation on the case of a boy at a distance, where amputation was deemed necessary. Though the cure was not so speedy or complete, as to gratify my expectation; yet no part of the failure could be attributed to the immediate application of the flap; its want of success depended on too frequent a removal of the adhesive plaisters, which produced sloughs upon the flap and edge of the stump.

C A S E

C A S E IV.

*An AMPUTATION above the ANCLE  
with a FLAP, by Mr. CHARLES  
WHITE, F. R. S. and Surgeon to the  
INFIRMARY at MANCHESTER.*

NOVEMBER 30th, 1781, I received the following account from Mr. Charles White. " I amputated a young man's leg, about six inches below the knee, reserving a flap, which I formed at one stroke; eight ligatures were applied, and one of them secured three small vessels; the flap was immediately laid to the end of the stump, and secured by slips of cerate pledget, and a flannel bandage. All the ligatures came away by the ninth day, except one, which secured the three vessels; this continued on 'till five weeks after the opera-

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tion.

tion. In six weeks the wound was perfectly healed, and would have been so much sooner, if the last ligature had not prevented it. The patient is twenty years old. I never saw so good a stump, nor one that ever gave so little pain to the patient, nor so little trouble to the surgeon."

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C A S E V.

*An AMPUTATION above the ANGLE  
with a FLAP.*

NO other opportunity occurred to me, 'till April 1781 ; I then received a letter from a surgeon in the country, desiring I would admit into the Infirmary, Thomas Ackers, from Leigh, in this county. Soon after this the patient came with a diseased ankle joint ; the enlargement was prodigious ; the  
capsular

capsular ligament was protruded on each side the joint by a fluid which fluctuated through it, from side to side. He was naturally thin, and very delicate ; but the state of his general health was now alarming. His countenance was remarkably pale, and his whole body greatly emaciated ; he had a violent hectic, with profuse night-sweats. He was a very unfavourable subject for any operation ; but upon a proper representation of the matter, I found him desirous of trying the flap operation above the ankle.

THE amputation was done April 21, 1781 ; the only difference in the mode of operation on him, and Murray, was in the formation of the flap ; which in this case was made by pushing a double edged knife through the leg, and passing it downwards, and then outwards, in a line first marked out for the direction of the knife ; hence the flap was  
formed

formed quicker by this method. The rest of the operation on the soft parts was finished with the same instrument; the retractor applied, and the bone divided as high up as possible. Four vessels were superficially tied, with the assistance of the tenaculum. The flap was then applied, and retained by sutures through the skin, and by adhesive plaisters.

AFTER having gone so far, I discovered that one stitch at least ought to have been passed through the whole substance of the flap, and not into the integuments only; as the smallest endeavour of the patient to move the limb, put the muscular part of the flap into motion; and hence might not only occasion pain, but prove an impediment to the intended union. ' However, as the business was now so far compleated, it made me unwilling to put the patient  
to

to more pain ; but I determined to profit by this observation in future.

I THOUGHT the apparently irritable state of the patient, indicated opium, of which two grains were immediately given ; the saline draughts, and lemonade for common drink, were directed to palliate the symptomatic fever ; he continued tolerably easy the remaining part of the day, therefore only one grain of opium was repeated at bed time.

THE 22d : in the morning he appeared very easy ; in the evening I was much alarmed on being sent for, and informed that he had been sinking all the afternoon. He was now very languid, in cold sweats, singultus, tremors, and subsultus tendinum, and the pulse extremely feeble. On particular enquiry, I found he had refused all sustenance since the operation,

operation, having taken only the lemonade and saline draughts. In the place of these I ordered the following cordial mixture, R. Vin. rub.  $\text{ʒ}^{\text{xii}}$  Infus. Cort. Peruv.  $\text{ʒ}^{\text{ii}}$  Elix. pareg.  $\text{ʒ}^{\text{ii}}$  M. cap. coch  $\text{ii}$  vel  $\text{iii}$  singulis horis: I directed likewise half a pint of mutton broth to be given as a nutritive glyster, and to be retained if possible.

THE 23d: found him much recruited; the medicine agreed with his stomach, the whole of the glyster had been retained. Repeat the glyster; give the cordial mixture less frequently, and, in place of it, let him take sago gruel. In the evening he was considerably recovered.

THE 24th: removed the dressings; swelling and tension moderate; a considerable quantity of serous discharge; complains of spasmodic twitchings: R Aq. Veg. miner.  $\text{ʒ}^{\text{ii}}$  Op. pur.  $\text{ʒ}^{\text{ii}}$   
M.



M. f. solutio parti affectæ applicanda.  
Capiat Pulv. Cort. Peruv. ʒii sexta  
quaque hora in haustu misturæ car-  
diacæ.

THE 25th: spasms more frequent;  
little rest in the night; a fulness  
and tension appear on the stump, with  
a high degree of erysipelatous inflam-  
mation, extending from the wound,  
up to the knee; the discharge con-  
siderable; took out the stitches, with  
which the edges of the wound had  
been closed, and dressed the inflamed  
part with a soft cerate, and over this  
the solution as before. He seems  
much recruited; takes nourishment  
freely; has stools regularly: to pro-  
cure a better night let him take an  
opiate.

THE 26th: inflammation abated;  
pulse less frequent; inclination for  
food increased, passed a better night,  
having slept four hours; the stump  
easier;

easier; give the medicines and dress the wound as before.

THE 27th: passed a very restless night; spasms violent; discharge thin, foul, and large, inasmuch that it may be pressed from under the skin, between the wound and knee. Medicine and dressing as before.

THE 28th: a very restless night; much enfeebled, and dispirited; discharge uncommonly large: it appeared certain, that an extensive suppuration had formed under the skin, between the wound and knee, where there was a lodgement of matter; and that the *membrana adiposa* was in a sloughy state: to give vent to these, I made two large openings through the skin, distant from each other about three inches, one on each side the tibia, extending from the wound about half way up to the knee. As it was evident,

dent, that without a vigorous exertion, without proper vents to prevent a lodgement, and the consequent increase of matter, the patient must soon sink; the clear indication therefore, was to put a stop to the discharge as speedily as possible, both by openings and the most tonic dressings: for the latter purpose, I have not found any thing so effectual, as the following mixture, with which all the dressings, compresses and bandage, were kept constantly wet: R. Aq. Calcis. simp. Sp. Vin. ten. aa. p. æ. M. many large discharges have I seen restrained, and many a limb saved by this tonic application, assisted by proper internal medicines; where the discharge has been too large, from pursuing the reducing plan, the antiphlogistic regimen, and the use of relaxing poultices, too far.

THE membrana adiposa and tendinous parts were extensively sloughy:  
hence

hence the openings gave vent to a considerable quantity of matter and sloughs; the internal tonics were not neglected; the bark and wine, with opium to allay pain, were assiduously administered.

THIS day upon gently pulling at the ligatures which secured the arteries, they all separated, and were drawn out. It is surprizing that the newly united flap was not in the least separated by this extensive supuration, which took place so near it; the flap appeared as cool and firmly attached, as though these unfavourable changes had not happened.

I HAD the satisfaction to find the above treatment successful; the discharge immediately abated; the patient slept, took nourishment, and recovered strength; he was taken out of bed, and kept up several hours  
every

every day, by which he was most sensibly assisted; in short, he soon recovered so effectually, that he was able to undergo the fatigue of a removal into the country, for the benefit of the air.

ON an examination of the wound, at the expiration of a month from the date of the amputation, I found it reduced to the size of a silver penny; but this had a ragged, scrophulous appearance. He remained under my care, about three weeks longer; during which his general health was considerably improved, but the wound was not perfectly healed.

As he could not be conveniently supported in the country near this place, I advised him to return to his friends, into pure air, a more favourable situation for the total recovery of his general health than confine-

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ment

ment in a hospital; and likewise recommended the cold bath, bark and cicuta; with an attention to keeping the wound clean, and to dress it with soft mild applications. By this treatment the wound healed in a month, his general health was perfectly restored, he walks remarkably well, and has not been troubled with the smallest excoriation.

THIS case cost me more attention and anxiety, than any amputation I had ever performed; and my patient was in more danger, which I imagine was principally occasioned by the long continued pain and absorption, previous to the operation, and a delicate constitution. I think this case is considerably in favour of the flap operation, as it proves how firmly the parts adhere, after the union has once taken place; and that it may be expected, the flap will unite, in  
even

even the most enfeebled constitution.

MR. WHITE favoured me with an account of two thigh amputations, with a flap, which was formed from the anterior part above the patella, both of which were successful. In the first, dated February 18th, 1781, there was no hæmorrhage, a moderate discharge, no exfoliation; and the wound was eleven weeks in healing: in the other, April 9th, 1781, no hæmorrhage, small discharge, no exfoliation; and healed in five weeks.

I HAD not another opportunity of doing the flap operation above the ankle, before October, 1781; but, in the interim it was done in our Infirmary, twice above the ankle, and once in the thigh: in the latter, the flap was saved from the anterior part of the thigh, agreeably to O'Halloran's

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plan;

plan; but made larger, and formed out by the knife, as in Murray's case. All these succeeded very well; the thigh amputation was attended with a slight exfoliation, after the union was formed; but this, it was said, produced no material inconvenience.

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## C A S E VI.

*An AMPUTATION above the ANCLE  
with a FLAP.*

OCTOBER, 1781, John Whiteside, aged twenty-three, came to me for advice from the northern part of this county, with a diseased ancle joint, which originated from a neglected strain: I thought him a proper object for the Infirmary. The ancle bones were considerably enlarged, and the  
membranous



membranous parts much thickened; a sinus passed from the external ancle, into the joint, the bones of which were highly carious; the leg was emaciated and useless; the patient had not suffered much pain; the discharge had never been large, and consequently his general health was good.

THE limb was amputated above the ancle, October 15th: I first marked out the size of the flap with ink, and pushed the double-edged knife through the leg, so close to the posterior part of the tibia, that the point of the knife touched the bone, as it passed; then with my left hand I took hold of the point of the knife, and directed it out in the marked line previously formed; the flap was completed and the rest of the operation finished, as in the foregoing case. Four arteries were tied as nakedly as possible, with the assistance of the

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tenaculum.

tenaculum. Three futures were used; one in the center PASSED THROUGH THE WHOLE SUBSTANCE OF THE FLAP; one superficial, on each side; and intermediate to these, the edges of the wound were brought into contact, the protruded adipose membrane being first reduced with a probe.

THE symptoms subsequent to the operation were in every respect favourable; and the wound was dressed on the 18th, and had a promising aspect.

THE 19th: doing well in every respect.

THE 20th: the parts had an inflammatory aspect, from the end of the stump towards the knee, with tension, as in Ackers's case. I began to think the irritation of the futures had a share in producing this complaint; I therefore removed the stitches,  
and

and the circular bandage, and applied an emollient poultice: soon after this time, neither myself nor my patient had any farther material trouble. One ligature was drawn out on the 18th; another the 20th; and the remaining two, the 22d. Mr. White visited our hospital, and did me the favour to examine this stump the 16th day after the operation; when all was firmly united, and only a very small superficial wound remained unhealed; in another week all closed up, except two small openings, that with difficulty admitted the head of a small probe, which passed from one of them towards the edge of the tibia, and from the other, towards the fibula; the discharge was scarcely visible; a linen compress dipped in the Aq. Veget. miner. with a cerate pledget, was the only application afterwards used to the wound. A slight exfoliation took place from these openings, without any material pain or incon-

venience, except what arose from the wound being kept open.

I WAS informed a troublesome herpes and ulceration attacked the stump, after his return into the country, but at last he was perfectly cured.

IN the two first cases a contraction in the ham took place, from the relaxed position in which the limbs lay after the operation; and it was some time after the wounds were healed, before the parts would yield so as to admit of a complete elevation of the stump. The leg should be completely extended during the operation; and kept in that posture, 'till the wound is perfectly healed: this was done in Whiteside's case, by which, the perfect motion of the knee-joint was completely preserved.

C H A P. II.

*On what is called UNION by the FIRST INTENTION ; with PRACTICAL REMARKS, deduced from the FOREGOING CASES.*

**A**LL the visible parts of the human frame are believed to be of a vascular texture, and consequently have a circulation through them.

WHEN the surface of an internal membrane, or the internal surface of a wound is moderately inflamed, there is a mucus produced ; which I suppose is chiefly coagulable lymph. By this, recent wounds are first glued together, in the same manner, and by the same medium,

medium, as the surfaces of internal inflamed membranes are united.

INCISED wounds which are not united by the first intention, but suffered to go through the inflammatory stage, when kindly digested, will unite by the interposition of the discharge, if the edges be placed in contact; and I suppose this discharge is then congenial with what is called inflammatory exudation; thus is produced the secondary union of O'Halloran, in the flap operation.

IN wounds united by the first intention, the uniting medium is, at first, inorganic; yet the adhesion is so strong, that it is not easily separated.

THE vessels, secondarily, shoot through this gluten.

BEFORE this takes place, there is a great disposition in nature to form a  
cicatrix

cicatrix over this gluten, or uniting medium, from one lip of a wound, to the other.

HENCE you find that nature has provided a discharge from every wounded surface; which, if properly managed, is the sovereign balsam.

THE same medium will unite an inanimate substance to the surface of a wound. Is not the adhesion of the sponge and agaric, when used to restrain hæmorrhage, thus to be explained; and their uncertain success for several hours after their first application, thus easily accounted for; as this union must take up some time to be completed? Mr. White, on the use of the sponge, has the following observation. “There is one inconvenience attending its use, in very large arteries; which is, its uncertainty for a few hours after its application: so that I never durst  
trust

trust it, without its being narrowly watched for some time ; but after four or five hours were expired, I always thought it perfectly secure ; even more so, than the needle and ligature."

IF, by improper applications, the inflammation run high, this mucus is consequently dissolved, and becomes a thin, acrid matter ; and in such wound, however close in contact, previously to the inflammation, nature is disappointed in completing a union by the first intention ; or if united, such union will be resolved, and no other take place, 'till the discharge be altered, so as to assume the appearance of what surgeons call laudable pus ; and then we may expect the secondary union, before explained.

I WAS led into the foregoing reflections, by attending to amputated patients, and the following cases. I cut a  
boy's



boy's hair-lip; only the lower half united: the union did not succeed near the nose, from an extensive inflammation, a consequence of a previous adhesion between the lip and jaw, which it was necessary to divide in the operation. The secondary union likewise did not there take place; for the lips of the wound were not kept sufficiently in contact, at the proper time, by attentive dressing.

A SECOND operation was therefore necessary, and I attempted it a fortnight after the first; a cicatrix had formed over the lower part, which, as before observed, had united. The boy cried out violently, before the operation was begun; by which, and my taking the lip between my finger and thumb, the late united part and the cicatrix were both torn through; this did not produce a drop of blood: the surface that had been united was  
covered

covered with a white slough, which had all the aspect of inflammatory exudation.

IN a woman's thigh which I amputated, a considerable portion of the internal surface of the wound united by the first inflammatory exudation; she was for some time afterwards visited with a restlessness in the night; by this the newly united parts were, more than once, suddenly separated; there was no discharge of blood; and I observed the same white sloughy appearance, as in the boy's lip.

AFTER amputation as described in the foregoing pages, it is not to be expected that a union by the first intention of the whole internal surface of the wound, will completely take place; yet it will frequently be considerable: but a further advantage of placing the parts in contact is, that,  
by

by their remaining in that position, what is defective at first, will speedily take place secondarily, when digestion is perfectly formed.

UNION by inosculation, according to the true signification of the word, is ideal, as will clearly appear from the following fact.

A FLAP with a tendinous surface, applied upon a cartilage, will unite immediately; no one can be of opinion, that this is by inosculation.

I HAVE been induced to perform the flap operation, rather higher up, than usual. Pilkinton, a patient operated upon by Mr. Lucas very high up the leg, walked remarkably well. If we take it somewhat higher than usual, the flap is formed in a more muscular part; and can be made much thicker, than when it is formed lower down.

down, which are considerable advantages ; and the greatest inconveniences have frequently attended operating too near the diseased part, where the vessels are so increased in size, as to require more ligatures ; and sometimes occasion an hæmorrhage from the whole surface, or an ill uniting, or digesting wound.

THOSE who are operated upon with the flap, certainly have the advantage of others on whom the double incision is used. The former have a very thick cushion to defend the bone from the pressure of the machine ; this is formed of skin, adipose membrane, and a considerable portion of muscular and tendinous substance, which are all intermediate to the machine and extremities of the bones.

IN those, who are operated upon with the double incision, the skin and  
a little



them with the most ease and expedition.

It appears from the extensive disease so near the newly united flap in Ackers, not producing the least separation, that, when union has taken place, it does not easily give way; this encouraged me to use a poultice to Whiteside.

If futures be used, as union is so expeditiously completed, they have soon answered every good end, and should be divided early; and if it can be done with ease, drawn out to prevent irritation, tension, and consequent inflammation.

THE re-application of the adhesive plaisters is improper, for some time after the dressing immediately subsequent to the operation; since, during the inflammatory stage, they confine, heat, press and irritate the parts; they  
should

should therefore be laid aside, and the most soft and gentle applications used, 'till the suppurative stage be complete, and a state of relaxation takes place; the adhesive plaisters should now be re-applied, and will be found of the greatest use, to close and retain the edges of the wound in contact.

IN the mode of operation recommended in the foregoing part of this work, the cures are speedy and complete. In the arm, forearm, and at the usual place below the knee, the parts may be covered with skin and cellular membrane only; nor is it of so much consequence, that the oblique turn should be given to the knife, since no pressure is requisite upon the extremity of the stump after the cure.

As the flap operation consists, in a more tedious division of a larger surface, and hence is more painful,

M 2 particularly

#### 164 UNION BY THE FIRST INTENTION.

particularly with the addition of futures, (where these are thought necessary to support the flap,) I cannot think it attended with any advantages in the above parts, equal to the additional pain. The case is different in the thigh, and above the ancle: here a proportional weight of the body in walking, is to be supported upon the extremity of the stump; therefore, whether the flap operation in the thigh will supersede the common mode, where the oblique turn is fully given to the knife, future trials must determine.

I do not think myself authorised to say more on this last point at present; as I have but little experience of the flap in the thigh. I am however of opinion, that the flap operation above the ancle, will turn out a very useful and valuable deviation from the present practice.

PART



## P A R T IV.

## C H A P. I.

*On the* EXFOLIATION *of* CARTILAGES.

**W**HEN an amputation is made in a joint, one great impediment to a speedy cure, as wounds are generally treated, is an exfoliation of the cartilage. Exfoliation, or floughing, takes place in different parts, more or less speedily, in proportion as the part is more or less compact, and vascular. A cartilage is of a firm consistence. *Monro* is of opinion, that “ the articular cartilages, do not admit the coloured injections, and in none

of them does the injection enter deep into the substance of the cartilage; nay, madder, mixed with the food of animals, does not change the colour of cartilages, as it does of bones." *Monro's Osteology*. Therefore, agreeably to the foregoing principle, its exfoliation must be very tedious, and consequently surgeons have been anxious to prevent it. With this view Mr. Bromfield directs us to pare off the cartilage; for he says, "Repeated trials have confirmed me, that it shortens the cure considerably; for though sometimes the granulations may push through the cartilage, in a short time; yet, I have known the cure retarded several weeks, by waiting for the exfoliation." *Bromfield's Chirurg. Obs.* He likewise recommends this practice, in the amputation of the arm at its articulation with the scapula.

IMME-

IMMEDIATELY after Murray's case, I began to think, that the formation of a more complete flap or covering to the denuded cartilage and soft parts, than I had heretofore practised, would succeed, after the amputation of the fingers or toes. I had seen them but partially covered, and not with one complete flap, that would easily overspread the whole surface of the wound. I began this practice at the Dispensary, and there took off the ring-finger of a woman, forming a flap that covered the whole surface of the wound; this united as speedily as a hair-lip; the whole was completely healed in eight days; the cicatrix was so small and narrow, and the part appeared at first view so little discoloured or deformed, that it looked as though the woman had been born without that finger. Since the above, I have operated in fourteen cases, in which a finger, or toe, has been removed upon this plan, with the desired success.

IN these cases the flap was saved, either from the inside, outside, or side of the finger, or toe, as directed by the sound state of the skin. Different cases may require particular deviations; so that only general directions can be given. Mark out with ink the size of the intended flap; this is to be formed close to the joint intended to be cut through; cut down to the bone in this line, and separate the flap from the periosteum; pass the knife round the rest of the finger down to the bone, just above the articulation which it is intended to cut through; separate the parts all round the joint; then fix your finger nail of your left hand, upon the lateral ligament, opposite to the juncture of the bones; and, that this point may be exactly ascertained, let an assistant move the finger during your examination: your finger is to be retained on this ascertained spot, that the point of your knife may be exactly

exactly directed through the lateral ligament into the joint; now you are to move the knife freely from side to side, that the ligament may be fully divided: if this is fairly accomplished, the joint will dislocate so completely, that the rest of the operation may be finished with the most perfect ease. If the theca containing the tendon, or the tendon itself has a mangled appearance on the inside the flap, the theca should be opened, and the tendon cut out, as far as the flap extends, the whole internal surface of which is to be left smooth.

A SMALL double-edged knife is the most convenient instrument, for the above operation. After the flap is applied, it should be retained in contact, and the edges of the skin kept together, by adhesive plaisters; for which purpose, sometimes a single stitch with the needle and ligature, may be requisite.

AFTER

AFTER this operation, I have not found it necessary to tie up an artery to stop the bleeding, in either foot or hand; a gentle pressure upon the extremity of the vessels, for a few minutes, and the after-application of the flap, have always proved sufficient. If the hæmorrhage should not yield to these means, the tenaculum and a single thread may be used; as such treatment cannot prove a material obstacle to the desired union. The part should be dressed with lint, spread thin with some soft cooling ointment, that will be easily removed, and occasion the least irritation. A roller so applied as to press upon, and support the flap in contact with the opposite part of the wound, is advisable; but not so tight as to press rudely, and thence irritate and give pain.

To the inconsiderate, perhaps these directions may appear frivolous; but  
from

from a want of such a minute attention, and particularly in the perfect division of the lateral ligament, I have seen some of the best operators in the kingdom, very much perplexed in the execution of this business.

I HAVE not been disappointed of a speedy union, except in one case, where the great toe was taken off at its articulation with the metatarsal bone, and the flap saved from the under part: the whole tendinous parts concerned in the flap became a gangrenous slough, and consequently separated; notwithstanding which, there was no exfoliation of the cartilage; and the wound would have been soon healed, if the man had not irritated the part, by walking too much. When it was healed, it plainly appeared, that he had received considerable advantage from this mode of operation; for the cicatrix was remarkably small,

and

and so situated, as not to be pressed upon in walking. It is likewise to be observed, that this gangrene was occasioned by the putrid state of the air in the Infirmary; the patient had been confined in a ward, with many gangrenous, putrid, spreading sores; and had, no doubt, consequently received that infection.

WHEN the great toe is taken off in the usual method, the patient seldom walks without lameness, at least for a considerable time; and the wound is apt to fret upon much exercise. It is therefore of considerable consequence to save a flap, sufficient in size to cover the whole surface of the wound; the under part, or that next the sole of the foot, is always to be preferred for the formation of the flap; when this is done, the patient will in walking, make his pressure totally upon the old skin; hence that disagreeable tenderness and excoriation, troublesome to every person



perfon, but particularly inconvenient to the needy and laborious, are effectually prevented.

I HAVE not either feen, or heard of the leaft exfoliation from the cartilage, in any cafe where the flap operation has been practifed.

IT is not to be fupposed, that the intended union of a mufcular or tendinous furface upon cartilage, will always fucceed as well in crowded hofpitals as in private practice; but this fubject, I already have had occafion to treat more at large. As the operation in this way is fomewhat more tedious than the common mode, particularly if not done with boldnefs and dexterity; it may be afked, what advantage does the patient gain to compensate for this delay? To this I anfwer, his pain in the after-dreffings is alleviated, his cure is fhortened, and more complete;

complete; and a considerable degree of deformity prevented. As the dressings in the after-treatment in this mode, do not come in contact with a tenth part of the wounded surface, it is clear, that the soreness and pain must be in that proportion less than where the whole surface is exposed, inflamed and irritated. The cures are frequently extremely tedious where the cartilage exfoliates; and even when this does not happen, a wound with so large a surface, cannot be speedily healed.

As the quantity of skin and adjacent parts removed in the common way, are greater; in such a proportion is the deformity increased.

IT is an infallible maxim, that the more the surface of a wound is diminished by a judicious covering, from an artful preservation of skin;  
the

the less pain and inflammation will follow, and the more speedy will be the cure.

THE less new skin there is to be formed, the less will the patient be liable to after inconvenience, from pain, the irritation of cold air, and from the pressure of hard bodies.

DEFORMITY is the most effectually prevented, when the flap is saved from the outside of a finger; but in people who are to use hard labour, it is best to preserve it from the inside; as the new formed skin is further removed from the pressure of the hard implements, used in their necessary occupations.

## C H A P. II.

*On the AMPUTATION of the ARM  
at its ARTICULATION with the  
SCAPULA.*

**I**F you examine the writings of the best surgical authors, you will find that but few, even in the greatest run of practice, have amputated the arm at its articulation with the scapula; and you will likewise be convinced, that little satisfactory intelligence is to be obtained on this subject; if we except Mr. Bromfield's information, which highly merits an attentive perusal.

AT all times, unfortunate diseased subjects of all ages, with caries in the  
joint,

joint, and external injuries from gunshot, compound fractures, and wounds of the large blood vessels, must have rendered the necessity of operating nearly as frequent as at present. Hence it may reasonably be inferred, that either a dread of the danger and difficulty attending the operation, or a want of judgement in selecting those cases that required it, may be considered as the causes of its having been so seldom performed; and hence we may plainly discover, why so small a progress has been made towards rendering this operation complete: so that this honour seems to have been reserved for Mr. Bromfield, a well-known writer and practitioner of the present day. He is the only author who has reduced the operation to a regular plan; and this, not from speculation, but actual experience, the only true source of solid improvement.

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HOWEVER, it may be justly observed, that his patients were all similar, viz. those whose original disease was abscess, or caries in the neighbourhood of the joint. He observes, as to the operation, that “he had but little encouragement to do it at first, from those who had seen it performed repeatedly in the army; where the joint of the shoulder had been greatly injured by gun-shot, and amputation at the joint was the only chance for preserving life: for though the operations were seemingly well performed, and every thing went on well to all appearance, for near three weeks; yet I am told, the patients all died.” *Chir. Obs.* vol. I. p. 209.

It is much to be lamented, that the mode of operating, and the unfortunate progress of these cases, have not been particularly noted, and faithfully communicated to the public, as  
it

it is from such a record of facts only, that any real improvements can be expected. These histories being lost, posterity reaps no improvement; nor are we able to distinguish, whether these fatal events were owing to a want of improvement in the mode of operation; or depended upon the dangerous nature of the injuries, abstractedly.

IT has, however, been my lot, to amputate the arm at its articulation with the scapula, in a very unpromising case of gun-shot wound, with success; and as it is from accurate and well authenticated facts only, that we are to expect any solid improvements, I shall need no apology for presenting the reader with the following history of such an event. As the state of the parts to be divided in the operation were different from those in Mr. Bromfield's patients, I thought myself justi-

fied in a deviation from his mode of operation.

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C A S E VII.

*An AMPUTATION of the ARM, at  
its ARTICULATION with the  
SCAPULA.*

DANIEL CATLING, a middle-sized, strong, healthy man, is the subject of the following history. On March the 4th, 1774, he was ramming a cartridge into a cannon that had been just fired; some part of the wadding being yet alive in the breech of the gun fired the new charge; and he having his right arm opposite to the mouth of the gun, was blown from on board the vessel into the river: he was taken out apparently but half alive, and brought to the Infirmary.

ON



ON examination, it appeared that the right arm was carried off high up, just below the insertion of the deltoid muscle; the remaining bone and muscular substance were so much injured, that in consultation, it was determined to amputate at the articulation with the scapula. The skin was free from laceration about the joint, and even over the remaining injured bone and muscles; but considerable extravasation appeared in the cellular substance, upon the muscle called pectoralis major, the scapula, clavicle, and adjacent parts; the eye-brows and lashes were burnt off, and the integuments of the whole face had suffered considerably; the eyes were closed by the swelling of the lids; the pulse and breathing were tolerably good; but the patient was in a high degree of stupor, unless when much disturbed; in short, he appeared the most miserable object I had ever seen as the subject of an important operation.

His face, the state of the arm, and adjacent parts; the stupor, and excessive shock of the whole nervous system, rendered him a very unpromising subject to operate upon; and yet there was no alternative: the pulse and breathing, were the only favourable symptoms.

THE operation likewise was to be done with the disadvantage of candle-light, and I had but little time to form my plan. I had lately read Mr. Bromfield's account of his operations, and it then occurred to me, whether in case of gun-shot, or compound fracture with a wounded artery, requiring this amputation where the motion of the joint was free, the operation might not be reduced to a more simple form, such as follows.

CUT through the skin and adipose membrane round the arm, sufficiently below the acromion; go obliquely upwards,

wards through the deltoid and posterior muscles up to the joint; then go forwards, and after dividing the tendon of the musculus pectoralis major and adjacent parts, separate and tie the artery, which may be kept out of the way by the fingers of an assistant, while the head of the bone is taken out: if this cannot be easily executed for want of room, the integuments may be divided in front, from the acromion to the edge of the wound; but this last step, I would make an act of necessity.

IF the above scheme be practicable, the operation will be rendered more simple, and no futures required. I would have as much skin saved as will afterwards cover the whole surface of the wound, and no dressings applied within its edges; convinced that the cure would be more speedily completed by this mode of operation, and by leaving the cure of the wound more

to nature, and not obstructing her operations by the intrusion of dressings; in short, I expected the progress of the cure would be in some degree similar to our success in common amputations, where the parts are treated in the same manner.

THE patient was placed upon a table of convenient height covered with a double blanket, and the shoulder brought off the side of the table sufficiently to give room for the operator's hand and knife; and the requisite pressure was made upon the subclavian artery by the fingers of a judicious assistant. A circular incision was made about a hand's breadth below the acromion, and carried through the skin and membrana adiposa round the arm; the deltoid and posterior muscles were divided obliquely up to the capsular ligament; this was much facilitated by an assistant drawing up the skin with his fingers. I then divided the tendon  
of

of the biceps muscle, and the capsular ligament upon the anterior and posterior part of the joint; after which, an arterial branch discharged so freely, that we were convinced the pressure upon the subclavian artery was not effectual, although judiciously made; therefore I tied this vessel with the assistance of the tenaculum, and determined to finish the operation in the following manner: To divide the tendon of the pectoralis major, the capsular ligament all round; and the rest of the parts, except the artery, veins, nerves and cellular substance immediately adjacent; and as it was very difficult by so obscure a light to distinguish these parts so accurately as to be able to tie the blood vessels, and cut through the nerves higher up, as directed by Mr. Bromfield; I included the whole in a temporary ligature, held just tight enough to prevent hæmorrhage; below this the parts were divided, which finished the operation; that is, separated

rated the limb; after which, the artery and veins being drawn out together by the tenaculum, and included in the same ligature, the temporary one was removed.

THE whole cellular and muscular substance when divided, had a very unfavourable appearance, being loaded with extravasated blood; therefore, I took out as much of those parts as I could; and the same injury, with considerable tumefaction, will perhaps account for the pressure in the neighbourhood of the artery, not being sufficient to restrain the hæmorrhage. Indeed the parts divided in the operation appeared so bruised, that I thought a gangrene would almost certainly follow.

A CONSIDERABLE quantity of skin was saved; so that when it was placed over the muscles and acetabulum scapulæ, the wound had the appearance  
of

of little more than a line drawn from side to side across the face of the stump; and the ligatures were left out at the angle next the chest: long narrow slips of lint spread with a soft cooling ointment, were applied longitudinally, from below upwards, so as to approximate the lips of the wound, and these were assisted by two long pieces of sticking plaster; the whole was supported with a tow pledget, compress, and a light flannel roller. Directions were given, that the patient should take broth, and occasionally, gentle cordials and anodynes.

THE next day I was surprised to find the patient so well; he was restored to his senses; the symptomatic fever was moderate; but he complained greatly of soreness upon the face; was easy about the shoulder; had taken liquid nutriment freely; and what appeared very surprising, he had not the least recollection of the accident that  
had

had happened, nor of his having undergone an operation. Ordered to have the face constantly moistened with linen compresses, dipped in Aq. Veget. miner. that stools should be procured by clysters; that the antiphlogistic plan of diet and medicine be rigidly used, with anodynes occasionally.

It would be tedious and uninteresting, to recite the minute appearance at each dressing; therefore it may suffice to observe, that on the ninth day, he was in every respect as well as I could reasonably expect. The wound had a favourable appearance; the skin remained fixed nearly in the state it was placed after the operation; and the discharge was a small quantity of pus mixed with a thin synovial fluid; the extravasated blood in the neighbouring parts was absorbed, and the face likewise grew better; the patient was able to sit up most part of the day, and the  
ligatures



ligatures separated as soon as after a common amputation.

ON the 10th day he complained of cold and heat alternately, and said he was ill, although he could not well tell what complaint to make, his indisposition was so slight.

ON the 11th he appeared languid; the countenance sunk; the skin moist, cold and clammy; the wound pale and flabby, more disposed to open, and had gleeted largely. I was rather at a loss to determine whether these disagreeable changes were owing to his living in the Infirmary, which at this time was crowded, and moreover tainted by offensive discharges from several spreading putrid sores, and a full house; or to a want of a more generous regimen, than he had as yet been allowed.

IT

IT has been often observed in this house, that if our sailors and industrious mechanics, whose stations habituate them to hard labour, and the constant use of strong liquors, become the subjects of compound fractures, amputation, or any other important surgical injury, attended with large sores, they will not long remain healthy, under the antiphlogistic plan; not only their general health, but their sores will certainly grow worse; and these evils are to be remedied only by an indulgence of their former habits. The best remedies are, pure air, with proper cordials, such as wine, spirituous liquors, or ale; animal food in moderate quantities, with the bark, and tonic dressings to the injured parts.

To obviate the effects of foul air, and the want of a more tonic regimen, I removed my patient the next day, to the Park coffee-house, an elevated,  
airy

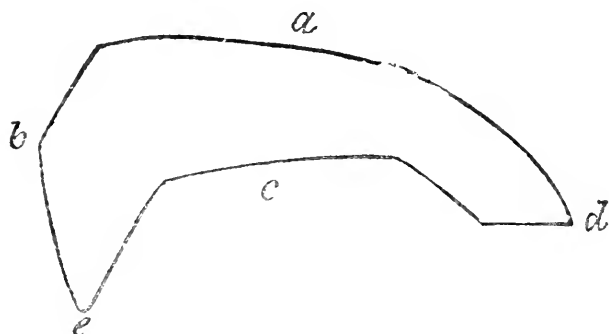
airy situation, at a convenient distance from the town; he was allowed animal food at noon, ale three or four times a day; and was directed to take the bark, and as the weather and his strength would permit, to walk in the garden.

So speedy was his recovery upon this plan, that on the 16th I was surprised to find that he came to my house in town to be dressed; and returned again into the country, on foot.

BOTH his general health and the wound improved daily. At the end of a month from the operation the wound was healed, except a small opening that would admit only the head of a probe, which passed up towards the acetabulum scapulæ, and discharged a synovial fluid in small quantities, and did not totally close for the space of a month longer;  
since

since which it has remained totally healed.

THE dressings were always applied externally, as at first, with a view to approximate the edges of the wound, the cicatrix of which was exactly the size here represented.



*a* The part next the acromion.

*b* Next the chest.

*c* The axilla.

*d* The angle next the back.

*e* The angle in front where the ligatures were left out.

I DO

I DO not mean to cast the least disrespectful reflection upon Mr. Bromfield's plan of operating and dressing; on the contrary, I think myself greatly obliged to him for the information I have received from his useful publication on this subject; my patient's case, and those that he operated upon, differed materially; and consequently, each may with propriety, admit of a different treatment.

It would be misleading the public not to confess, that although I accomplished my point with only a circular incision; yet it was executed with some difficulty: for the division of the capsular ligament would have been greatly facilitated, by the more easy access to the part, which would have been produced by a longitudinal incision from the acromion through the skin and deltoid muscle. On the contrary, when we consider the advantages  
O gained

gained by excluding the external air as much as possible, in many of the most important surgical cases; for instance, in compound fractures; in opening large deep-seated abscesses by a seton; the radical cure of the hydrocele by seton; the speedy cures made by placing the skin over the whole surface of the wound after amputation; the union of the muscular and tendinous parts upon cartilage, where we remove the fingers or toes, and cover the head of the bone with a flap; and the favourable termination of Dan. Catling's case; these reflections will make us anxious to finish the operation, where it can be done with tolerable ease, without the longitudinal incision along the deltoid muscle; by which the air would find more easy access into the cavity of the wound, and acetabulum scapulæ. Perhaps the free access of air into the joint may reasonably be considered as  
 one

one cause of the exfoliation of the cartilage; but a more powerful one is the application of dry lint, within the acetabulum scapulæ; which, by forming an adhesion, and consequently a retention of matter upon the part from day to day, will, I am of opinion, more certainly occasion an exfoliation of the cartilage in this instance, than it does of the bone, after amputation.

MR. BROMFIELD lays it down as a general rule, that the cartilage will exfoliate in every instance, p. 244. Speaking of Heister's advice to attempt an union by the first intention, he adds, " but he has forgot that, in case the head of the scapula is found, that the cartilage will prevent the union, 'till it is exfoliated." And from this opinion he regulates his practice; and p. 254. directs you to " pare off the cartilage, and apply dry lint to the bone, and let it remain, 'till

it drops off; and, probably, the granulations will then shew themselves, sprouting from the bone." This may be a necessary and judicious practice, where matter has previously lodged in the joint, and occasioned such an alteration in the texture of the parts, that exfoliation of bone and cartilage will consequently follow. But that in recent injuries, the cartilage will not always exfoliate after this operation, my patient's case furnishes a proof; and if instead of dressing the wound to the bottom with dry lint, the skin be placed as I have directed, and the dressings all applied exterior to the wound; the exfoliation of bone, or cartilage, will be frequently prevented; and nature not teased and interrupted by art, will do wonders, in speedily filling up and contracting the wound. As I was necessitated to operate by candle-light, I could not distinguish the  
minute



minute parts so exactly, as would have rendered the progress through the operation, more satisfactory to me; therefore, although the artery was left long, agreeably to Mr. Bromfield's direction, I durst not divide the nerves higher; yet the evils which such treatment is intended to obviate, were effectually prevented by the mode of dressing the wound; for the nerves were covered by the old skin.

It is now seven years since the operation was performed, the patient is in the most perfect health, which he has enjoyed ever since the wound healed: he is employed at the custom-house in this town; and is capable of going through the necessary fatigue of his station, by which he earns a comfortable livelihood.



P A R T V.

*Further HISTORIES and CASES in  
Proof of the foregoing Doctrine.*

I HAVE been favoured with an account of seven amputations in the thigh, done in a healthy Infirmary, by men, eminent in their profession; the success was not such as might have been expected, as only two perfectly succeeded, and this is the only unfavourable account which I have received.

“ IN the first, the patient was sixteen years old; the stump discharged

O 4                      largely,

largely; and there was a very considerable exfoliation: the cure took up twenty-eight weeks.

SECOND, the patient was twenty-two years old; all the symptoms moderate; and the patient cured in seven weeks.

THIRD, the patient twenty-two years old; had a considerable hæmorrhage on the fifth day; and likewise a large exfoliation: the wound healed in sixteen weeks.

FOURTH, twenty years old; all the symptoms moderate: the patient being in a bad state of health, was removed into the country, but the wound not quite healed in sixteen weeks.

FIFTH, twenty-five years old; symptoms moderate, cured in seven weeks.

SIXTH,

SIXTH, thirty years old; symptoms moderate: but the cure took up thirteen weeks.

SEVENTH, thirteen years old; hæmorrhage considerable the same evening. It is now three weeks since the operation, and there will probably be an exfoliation.

ALL the stumps were better than those which are generally performed in the common way; but I think I have seen as good, where the operation has been performed very low in the thigh, just above the head of the bone; especially where there had been old cicatrices and adhesions, by which means the muscles did not retract, but left a very flat stump, not in the least pointed."

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C A S E VIII.

*Two CASES of AMPUTATION by  
MR. LUCAS, SURGEON to the  
INFIRMARY at LEEDS.*

I AM particularly obliged to Mr. Lucas, of Leeds, for his constant information, and many useful hints on this subject, since I verbally communicated to him our method of amputation. The following is an abstract from his last letter on this subject, dated November 23, 1781; which contains his first operation, and the sequel of the case communicated by Mr. Hey.

“ NOT long after you had favoured  
me with your mode of amputating,  
which

which you intended soon to publish, I had an opportunity of putting it in practice, and beg of you to accept my sincere thanks for so valuable an improvement.

My patient was about twelve years old, and had a diseased knee. The operation was performed, October 2, 1779, as near as I could, pursuant to your verbal directions. I had no difficulty from omitting the tape, in making the incision through the muscles. I did not (as I find you have since directed, pages 12 and 33,) begin close under the retracted integuments; but a little lower, which preserved a sufficient quantity of muscle to support the skin. When the bone was sawn through, the edges of the stump might be readily brought in contact. I passed two ligatures on the principal artery, and also secured the rest by the use of the  
tenaculum;

tenaculum; both which methods have been our constant practice at the Infirmary, for some years. I secured the flannel bandage to a cloth, fastened around the patient's body, which is found less troublesome than having to pass the bandage round after the operation; and I now with it brought the edges in contact; so that no more than a line remained across the face of the stump, with the angles above and below.

IN making the incision through the muscles, I had taken off a small portion of the integuments, which had split forwards; by this, a small opening remained at the lower angle, just large enough to receive the ends of the ligatures, which were gradually withdrawn, in three or four dressings; and with as little difficulty as usual. No lint was applied within the edges of the wound; over which a little lint spread



spread with digestive and a compress of tow, formed the dressing, which was retained by a woollen knit cap.

I WAS surprised to find the girl, the following morning, with little or no fever; as well as to hear, that she did not complain of any startings in the stump, and had slept well. When I dressed it on the sixth day, there was so little discharge, as not to require a removal of the bandage; the edges looked inflamed a little; but within, there seemed such an union as made the wound appear more like an abscess laid open, than a recent stump.

IN twenty-seven days it was perfectly cicatrized, and has remained so ever since, without the least inflammation or uneasiness from pressure. The cicatrix, as you observe, is only a line across the stump; and the bone is  
so

so well covered, as to prevent any danger from its pressure on the soft parts.

NOVEMBER 27th, 1780, Esther Pearson, aged seventy-three, was admitted my patient at the Infirmary, for an accident she had just received ; which had broken both her legs. A heavy coal-waggon had run over them, and shattered the bones of both in such a manner, that one required immediate amputation ; the hæmorrhage being difficult to restrain.

MR. HEY, who arrived before me, proceeded to amputate. I came during the operation, and in time to have an opportunity of trying the bringing the edges together, (as you recommend in your postscript,) so as to form the line across the face of the stump, from side to side. The amputation was  
made

made above the knee ; the ligatures were left out at the inner angle.

THE other leg was so shattered, that it was thought necessary to remove three or four inches of the tibia. Although we were of opinion that she would have a better chance for her life, if we had amputated both legs ; yet we did not think ourselves warranted in taking such a step, as we should not have thought it necessary for the latter, had that only been broken. The limb was placed straight, and in a fracture box ; and I confess I left her, with little or no expectation of her recovery.

I FOUND her fever very moderate next day, and her whole complaints confined to her broken leg ; which seemed to go on as favourably, as if her other limb had not been injured. She was for the first three or four days, strictly confined to low diet ; after  
which,

which, attention was paid to her age. Happy for her, she had enjoyed a very good state of health, and been accustomed to live abstemiously.

I DRESSED the stump on the 7th day, when it appeared little short of being healed : there was no discharge to require any depending openings, and she always described her stump, as of no consequence, compared to her leg. The stump was dressed every third, every other, or every day, in proportion to the discharge, or necessity in taking down a fungus, which delayed the cure. It was not entirely healed, 'till about six weeks after the accident ; although the ulcer was very small, the greatest part of that time. It is, however, the best stump I have seen : the retraction of the flexor muscles has in this instance been of great use ; for by drawing the cicatrix downwards and backwards, it has removed it out of the way

way of pressure from an artificial leg; and left the whole face of the stump very much resembling the flap operation: I dare say, it would give you great pleasure to see it."

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## C A S E IX.

*From T. KEATE, Esq. SURGEON in ordinary, to his ROYAL HIGHNESS the PRINCE of WALES.*

"I TAKE the liberty of acquainting you with the result of your method of amputation, in one instance that has fallen within my knowledge. I flatter myself also, that the circumstances of this case, prior to the operation, were such as must in future afford a fair prospect in most others; if the OPERATION IS PERFORMED IN A SIMILAR WAY.

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THE constitution in this case, having been much worn by hectic symptoms, a small and very quick pulse, with colliquative sweats and purgings, owing to ulcerations in the bony, as well as soft parts, there was great reason to be apprehensive of the event. The case occurred in the Hospital appropriated to the first regiment of foot guards, of which I have the direction.

I PERFORMED the operation on the 12th of May, 1780, above the knee, agreeable to the rules prescribed in your practical observations. The patient had occasion for very little opium; had no spasms; or fever enough to require any particular attention.

ON the 5th day, when the dressings were removed, on which there was but little appearance of any discharge, the stump exhibited the most flattering  
appearance

appearance I had ever seen in such a situation; a wound not more than one third of an inch broad, nor more than two thirds of the diameter of the stump in length; the whole appearing to be perfectly united, except at the inner angle, where the ligatures were left hanging out. Two of these, (for there were three in all,) separated and came away with the dressings on the 14th day, the other remained to the 18th, and by the 21st the whole was healed, except one small opening, through which some raw dust was working its way, from the extremity of the bone.

FROM the conversation I have had with other gentlemen of the profession, who saw the operation, and were witnesses to the good effects resulting from it, I am of opinion, it is likely to be generally adopted; and, if it is, I think it cannot fail of being generally useful."

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C A S E X.

*An AMPUTATION in the THIGH, &c.  
by MR. WILLIAM HEY, F.R.S.  
and SURGEON to the INFIRMARY  
at LEEDS, dated December 26th,  
1780.*

“SINCE your propofal of an improvement in the amputation above the knee, we have had an opportunity of performing it feven times, at the general Infirmary at Leeds. Five of thefe operations fell to my lot; and it is with great pleafure I can inform you, that the method you propofed, promifes to be of great utility. One or two of the ftumps were healed in about eighteen days.

A LITTLE while ago, an old woman, aged feventy-two, was brought into  
our



our hospital, with a compound fracture of each leg. One of the legs was so dreadfully contused, that it was necessary to amputate it above the knee; in the other leg, about four or five inches of the tibia came away, and the limb was treated in the usual manner.

THE woman has recovered so well, that she seems now out of danger; the wounded stump seemed to add nothing to her danger; and she went on as well as if the amputated leg had been whole.

THIS poor woman reaped, undoubtedly, the greatest benefit from the absence of the symptomatic fever, which always succeeds an amputation in the ordinary way."

IN a subsequent account, containing many useful hints, the result of

attentive observation, and for which I am much obliged to the author, he adds the following passage.

“ I ENTIRELY agree with you in your enumeration of the advantages gained by your method. It greatly lessens the danger of hæmorrhage, prevents spasms, renders the symptomatic fever trifling, obviates the pain of dressing the wound, shortens the time of cure, and forms (in the thigh, at least,) the best cicatrix. I have seen no instance of its confining matter.”

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## HISTORY XI.

By MR. KENNEDY, SURGEON *to the*  
INFIRMARY at BIRMINGHAM, *dated*  
*February 26th, 1781.*

“ YOUR mode of amputating has  
been practised in the Birmingham  
Hospital,

Hospital, with the greatest success. Eleven cases occurred there in the last year, all of which did well; most of them were cured in five or six weeks, and many of them in two or three and twenty days.

A GIRL, a patient of my own, aged sixteen, had her leg amputated below the knee, April 29th, and was discharged cured, May 20th. I have not taken down any of the cases, and therefore cannot furnish you with the particulars of them; but, if you should favour us with any future publication upon this subject, you have my leave to make what use you think proper, of the information I have given you of our success."

## HISTORY XII.

By MR. FREER, *Jun.* SURGEON to  
*the INFIRMARY at BIRMINGHAM,*  
*dated March 13th, 1781.*

“I THINK it my duty to inform you of the success that has attended your mode of amputation, in my practice, and in that of my colleagues at this Hospital ; as it cannot fail giving you pleasure, and, by confirming the propriety of the method, may assist in rendering it universal.

A CONVICTION in my mind of the advantages to be gained by it, set aside those prejudices, which we are apt to have for old methods ; and which alone, in my opinion, can prevent your mode of amputation from being universally  
adopted

adopted. Although my first operation was not attended with the success that our later ones have, yet, we gained great advantages over the old method, and sufficient to induce us to put it again in practice, when an opportunity should offer.

MR. KENNEDY has I think, informed you of the success in some instances; and I now add to them the following.

1. A MAN aged thirty, cured in twenty-seven days, below the knee.

2. A MAN aged thirty-two, cured in twenty-six days, below the knee.

3. A GIRL aged fifteen, cured in eighteen days, above the knee, including that of the operation. No one disagreeable circumstance supervened in any of these cases; and their  
stumps

stumps are remarkably good. Exclusive of the advantages gained by the speedy cures, there is another still greater; and that is no less than the preservation of the lives of the patients in many instances. No. 1, and 3, were so much exhausted by discharges from diseased joints; and had likewise such a copious expectoration of purulent matter, with a violent cough, that we should have had no hopes of their recovery, had they been to have undergone the suppurations, and the long confinement of the old method.

OUT of a great many cases that have offered and undergone the operation, though several were deplorable, we had the good fortune not to lose one."

I AM likewise favoured with a subsequent account from Mr. Freer, dated October 28th, 1781.

" I CAN

“ I CAN now say that I have seen twenty patients amputated in your way; and that out of these, only one can be said to die of the operation, or in any consequence of it. Many of them were in so perilous a state of health, as to be thought incapable of bearing the operation; and that, in my opinion, the lives of several were saved, by the advantages this operation has over the mode commonly used. The discharge has, in every case, been very small; so trifling as not to render it dangerous, even to the weakest habits. The spasm subsequent to the operation of amputation, has been to us unknown, except in one instance, which was that of the boy who died; and the patients have in general, when put into bed, been easier, and better in health, than before the operation. The fever has in every case been trifling, and we have had no hæmorrhage

rhage that required the dressings to be changed, but in one case.

I HAVE cured one in eighteen days, after amputation in the thigh; but we have several cured in between twenty and thirty days; and some have held out for six weeks or two months. If a stump is not healed in five or six weeks, I think it an unfavourable case, unless the limb is very large."

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### C A S E XIII.

*An AMPUTATION of the THIGH, by  
MR. JAMES GERARD, SURGEON  
to the LEVERPOOL DISPENSARY.*

"AT your request, I have drawn up, for insertion in the next edition of your treatise, the heads of Mrs. Clarke's amputation, at which you was present.  
She



She was formerly of Bristol, and is returned thither since the operation; and, as its intent is solely to illustrate the utility and preference which this mode of operating justly claims, I think it sufficient to say, that a diseased knee-joint of several years standing, attended with carious bones, and violent symptomatic fever which returned upon every fresh formation of matter, made it expedient to remove the limb above the knee. It is proper however to observe, that at the time of operating, she was in a tolerable state of health; but much reduced.

THE operation was performed on the 12th of July, 1780, agreeably to the method laid down in your treatise; after which, she had little or no symptomatic fever, or any other troublesome symptoms, except slight spasmodic affections, which continued at  
times

times for two or three days, but were relieved by opiates.

ON the 16th, the dressings were removed, the tension was moderate, and the discharge very small; the lips, which had been brought together, remained in contact, and began to unite; except one small space in the center, where the ligatures came out, not larger than the end of one's finger. It was, nevertheless, thought proper to cut one or two turns of the circular flannel roller, in order to lessen what little tension there was on the stump. Slips of lint, armed with cerate, were applied across the wound, and compresses moistened with Aq. Veget. min. cu Sp. Vin. ten. over the whole, and retained by means of an easy bandage.

ON the 17th, the tension was less than on the preceding day; the ligatures were gently moved to facilitate  
their

their separation, and the part dressed as before.

ON the 18th, the discharge was very small, and the ligatures were again gently moved, and the dressings applied as yesterday.

ON the 19th, the opiates which she had hitherto taken, became unnecessary. Her appetite and spirits were tolerably good, and she observed, that she felt herself more comfortable than she had done for two years past. The ligatures still remaining fast, the dressings, &c. were applied as usual.

ON the 20th, 21st, and 22d, nearly as on the preceding days; tension and discharge almost nothing; the space in the middle filling up, and the line of contact, from the center to the ligatures, on each side, beginning to cicatrize; and one ligature was removed

moved without the smallest inconvenience.

ON the 23d, the circular flannel roller was removed, and a clean one very loofely applied ; two other ligatures caſt off ; and there was more appearance of cicatrix. She now began to fit up a little.

ON the 25th, two remaining ligatures ſeparated, which had continued longer than was defirable, or uſual ; but no diſadvantage aroſe from that circumſtance, farther than retarding the union in that particular part.

ON the 26th, her ſtrength and ſpirits ſtill improved ; ſhe bore to fit up a great part of the day ; there was ſcarce any veſtige left from whence the ligatures came ; and the other parts were firmly cicatrized.

ON

ON the 27th, 28th, and 29th, every part except the center, which was then very small, perfectly healed over. She was down stairs the two last days.

ON the 30th, she was so well as to be carried to a friend's house in the neighbourhood, on a visit; and on the 2d of August, farther attendance was unnecessary.

NOTE; It may not be improper to observe, that this patient was three months advanced in pregnancy when the operation was performed; which circumstance she concealed till her cure was completed, and no inconvenience occurred; on the contrary, she advanced as successfully, as though no operation had been performed."

IN the above history we find, that in eighteen days from the date of the operation, the patient made a visit to  
 Q her

her neighbours ; and in three weeks, the stump was completely healed. Immediately after the operation, I was fearful there was scarcely a sufficient proportion of integuments preserved to cover the wound ; upon examining it after the cure, it appeared that the skin and muscular substance were preserved in the most advantageous proportion. When applied over the wounded surface immediately after the operation, the edges required a moderate support from the sticking plaisters to keep them in contact ; hence the stump when healed, was plump, had an even surface, and the cicatrix was remarkably small.

CASE

## H I S T O R Y XIV.

*Two CASES of AMPUTATION by MR.  
BICKERSTETH, SURGEON at KIRK-  
BY-LONSDALE, WESTMORLAND,  
dated January 4th, 1781.*

“ I HAVE only had two cases, since I had the opportunity of putting your method in execution ; and though the disease which rendered the operation necessary in both, was incurable ; yet I had so little trouble in the healing of the stumps, compared to what I have had in former cases, that I have formed the highest opinion possible, of your improvement.

ONE of my patients was a woman about the age of thirty-four; and the

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other a boy about sixteen; the cases were the same in both, viz. carious carpal bones from a scrofulous cause; and they were both hereditary. The patients were both very much reduced by the long continued discharge from the joints, and could neither of them have survived many weeks if the operation had not taken place.

As I did not note down the appearance of the stumps at each dressing, I am sorry I can only inform you in general, that I had not the least trouble with them, or any interruption during the cures, which were much more speedy than any I ever had before; neither hæmorrhage, spasm, nor symptomatic fever followed, from which I have formerly seen patients suffer so much; both amputations were made about the middle of the fore-arm, EXACTLY AFTER THE METHOD YOU RECOMMEND.



ON the first dressing I found the integuments as I had left them; the discharge of matter was trifling; no exfoliation ensued; and the wounds in both were healed within three weeks. The morning after the operation, the woman assured me, she had passed a much easier night than she had done for many weeks; her spirits and strength improved daily; the catamenia returned, which had been a long time obstructed; and she appeared to enjoy perfect health about three months; when, notwithstanding these flattering appearances, the disease unfortunately fell upon her lungs, and she lately died consumptive.

THE boy enjoyed health longer than she; but some scrofulous ulcers have lately made their appearance about his breast and shoulder; which will, I fear, be fatal to him in the end.

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I HAVE

I HAVE thus, as near as I can recollect, given you a faithful account of the two cases I have had ; and should be happy I could say any thing farther in recommendation of a practice, which will certainly greatly alleviate the sufferings of those, who are obliged to have recourse to this operation."

THESE cases, with many others which have fallen under my observation, are proofs that we may procure a considerable degree of union, and a speedy cure, in the most emaciated and the worst scrofulous habits. I have found it an invariable rule, that the more the patient is emaciated, the more speedy and certain is the union; and that, where we have the most adipose and cellular membrane, the more extensive is the suppuration. I am confirmed in this opinion by the observations of Mr. Freer, and several of my other correspondents.

CASE

## C A S E XV.

*An AMPUTATION in the THIGH, by  
Mr. WILMER, SURGEON at COVEN-  
TRY, dated September 22, 1781.*

“ A Middle-aged healthy man fell down before a waggon loaden with coals ; both wheels passed over one leg, from the ankle obliquely upward. The laceration of the capsular ligament of the joint ; the protrusion of the end of the tibia ; the comminution of that bone with the fibula ; the dreadful laceration of all the surrounding muscles ; but, more than all, an alarming hæmorrhage, from the arteria tibialis postica, rendered amputation the unicum remedium.

I PERFORMED the operation according to your prescription; and every circumstance was prosperous to our wishes for a considerable time: but before an union could be had between the skin and the end of the muscles, a very alarming hæmorrhage suddenly took place. When the dressings were removed, I could not, by the most diligent examination, perceive from what point the blood came. It returned three times, although styptic applications with pressure were used. After the last eruption, at a time when I thought another must prove fatal, I covered the muscular parts of the stump with powdered resin; this succeeded; and, notwithstanding the intermission which this accident gave to the cure, the stump was effectually healed in six weeks."

CASE

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C A S E XVI.*An AMPUTATION in the THIGH.*

IN the year 1779, Henry Knowland, aged forty, had always been healthy, 'till he received a gun-shot wound by a musket ball, which entered on the upper part of the tibia, just below the insertion of the patella; it passed obliquely downwards and outward through the tibia and fibula, from which it penetrated the muscles, and made its way through the skin on the outside and middle part of the leg. It was a fortnight after the accident before he arrived from sea; he was then immediately carried into the Infirmary. The whole leg was  
now

now considerably enlarged; near the fractured parts there were large extravasations, and the rest of the more extended swelling appeared of the œdematous kind; the foot was very cold, with a languid circulation through the whole limb; the two latter symptoms indicated a wound in some considerable artery.

THE state of his general health was very unfavourable; his pulse small, quick, and languid; the tongue dry, and covered with a brown fur; and his countenance sunk, with a general languor and depression. By a necessary dilatation of the bullet-holes, a considerable quantity of sanies, most highly offensive, mixed with putrid clots of blood, was discharged, and sufficient room given for the extraction of many loose splinters. Powerful antiseptic fomentations and poultices, whose basis was a decoction  
of

of Flor. Chamæm. with Cort. Peruv. were applied externally; and the bark with red port, was given internally. By these means he was greatly relieved during the putrid state: afterwards, an extensive suppuration required a dilatation of sinuses to prevent lodgement of matter, with an external application of the tonic astringent topics.

THE above means succeeded, so as to give hopes that the limb might be saved; and from time to time callus formed that gave considerable firmness to the bone; but from repeated returns of a deep-seated hæmorrhage, coagulated blood accumulated in different parts of the limb; and hence followed large discharges of the putrid sanies, with new formed sinuses and alternate solutions of the callus; so that after one of these attacks,

attacks, the fracture was as much disunited as at first.

AFTER attempts continued for four months to save the limb, by diet, the most powerful medicines, necessary dilatations to discharge large offensive collections of bloody sanies, and extracting splinters, an hæmorrhage came on, which, although soon restrained, put an end to all our hopes; and was succeeded by the train of symptoms before described, which our patient's general health appeared now quite incapable of supporting. He was excessively emaciated; his stomach so enfeebled as to be incapable of bearing any solid food; and even liquids in small quantities only. The hæmorrhage was evidently from under the callus, in the center of the limb; and all former trials by proper openings, had proved insufficient to discover the bleeding vessel. The callus, which was extensive, large and  
irregular,



irregular, and had some degree of firmness ten days since, was now loose, and so soft as to admit a probe to pass through it in any direction. The whole limb was relaxed, and discharged largely; and nearly the whole of the cellular membrane was loaded with coagulated blood. Hence he was threatened with a speedy dissolution; and reduced to this alternative, either to part with the limb, or his life. He chose the former.

HE suffered an amputation above the knee, January 12th, 1780. The circular incision was begun very near the patella; and after the necessary separation of the cellular attachments, the edge of the knife was applied upon the muscles, within the edge of the wound on the inside of the thigh; and by fully giving it the oblique turn, the bone was laid bare sufficiently high up, and drawing the knife towards me, 'till its  
point

point rested upon the bone, the muscles were divided all round the limb by passing the knife in the same direction, its point revolving round the bone.

AN assistant was careful to preserve the skin from being wounded by the edge of the knife, as it passed the under part of the limb. The skin and muscles were firmly drawn upwards during the whole incision; and afterwards, by the assistance of the retractor, the bone was without difficulty, divided as high as possible with the saw.

FIVE vessels were drawn out with the tenaculum, and tied nearly naked, by a slender ligature, and the inclusion of the nerves avoided. The circular flannel bandage was used, and the skin placed over the stump so as to form the line across the face of it from side to side. The edges of the wound were drawn together, and supported in close contact by slips of sticking plaster, first  
placing

placing the ligatures out as they lay most convenient, three from the external, and two from the internal angle of the wound. The integuments and muscles had been divided in such a proportion, as to cover the wound exactly. Pledgets of lint spread with cerate, and a linen compress and roller finished the dressing.

THE patient went on with every symptom very favourable ; the discharge appeared so small, as not to wet through the dressings, which therefore were not removed, 'till the 18th, when the parts were found exactly in contact : the dressings were re-applied as usual, with the compress dipped in Aq. Veget. miner.

ON the 21st, four ligatures were drawn out, with little pain to the patient ; and the fifth, which remained on the large artery, separated the next day.

day. He was from this time, taken out of bed every day; and the bark, with a nutritive diet, were used. By a proper and well timed re-application of the sticking plaister after the inflammatory stage, the edges of the wound were kept in contact, and the secondary union much promoted; and in eighteen days the whole was nearly healed.

FROM this time he altered for the worse; the wound grew fore, foul, and discharged an ill-coloured bloody sanies; his appetite failed him, and he was much debilitated; several fore pimples broke out upon his face, his right eye being inflamed, was painful, and discharged a thin watry fluid that excoriated his cheek. He was therefore removed into the country, to restore his general health; and to correct the acrimony in his habit, a proper diet and medicines were prescribed, and directions

directions given to keep him out of bed as much as possible.

ON February 23d, five weeks from the operation, the stump appeared so perfectly healed as to require no further dressing; his eye and pimples were well; his general health was likewise much improved, considering that the prescribed plan had been in every particular, only partially followed.

FROM this time his invincible obstinacy of temper could not be conquered, either by threats or persuasion; he kept his bed constantly, and indulged himself in the most improper diet. I afterwards discovered this was likewise the case while he was in the hospital.

HE took broiled bacon for breakfast, and was guilty of many other irregularities; he was too indolent to assist  
R. himself,

himself, and too obstinate to receive help from any other person: he was dirty beyond description. His eyes inflamed, the heated pimples returned, his stump excoriated from inattention, he was too lazy to dress it, and would not suffer the people in the house to assist him. He had been in bed for a week when I visited him, and had never washed his face or hands the whole time.

I REMOVED him to the Infirmary, that he might be under our more immediate inspection. He was desired to take the bark, and small doses of calomel as an alterative; cooling repellent washes were used to his eye. He continued bed-ridden, obstinate, sulky, and indolent; every attention to serve him proved ineffectual. I was therefore under the disagreeable necessity of discharging him the Infirmary, in hopes that his necessities would compel him

to

to exert himself. In this I was mistaken; he had some money left, and fell into the hands of those who were ready to indulge him to have an opportunity of assisting him in spending it. He presently confined himself to bed, in a cellar near the dock, where he eat and drank whatever he pleased, and his stump remained ulcerated for want of cleanliness.

I WAS disappointed in every attempt to serve him; he had been a great expence to the Infirmary during the attempts to save his limb, but this was frustrated by the nature of his disease. His recovery from the amputation was speedy and perfect; but this advantage was lost through his obstinacy, indolence, and determination to lie down and die. However, I thought it my duty still to use all possible means to preserve him: his obstinacy of temper was his misfortune by

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nature;

nature; his indolence a habit contracted from the length of his confinement; both which rendered him an object of compassion. He was, therefore, once more prevailed upon to return into the country, where he still persevered in his obstinacy. He returned again to his old lodgings in the cellar. I procured a pass for him to Ireland; but this was turned into what little money it would fetch. At last, all being spent, and every means of support withdrawn, he was turned out by his landlady, and forced by necessity to go to Ireland, the place of his nativity. By the journey and his necessities he got perfectly roused from his indolence; and I was informed, afterwards recovered a perfect state of health.

I THREW some injection into the diseased limb; and by dissection, discovered that the arteria tibialis postica  
just



just at its origin, had been entirely divided; the upper wounded portion was healed; but the lower remained open, and was the part from which the hæmorrhage repeatedly proceeded.

IMMEDIATELY after this accident, an experienced surgeon would have made a longitudinal incision in the course of the fractured tibia, of sufficient size to have easily permitted the extraction of all the loose and detached splinters, and given vent to the extravasated fluid: the removal of these would have made a ready way to the injured artery, which might, and ought to have been secured by ligature, or restrained by the Ol Terebinth, which latter I have known succeed in a similar hæmorrhage attending a compound fracture of the leg. Hence, that fatal return of hæmorrhage, and effusion of blood through the whole limb, would have been prevented; which, with

the removal of the irritation from splinters, would probably have insured the man an easy, complete, and speedy cure.

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## C A S E XVII.

### *An AMPUTATION in the THIGH.*

IN the year 1780, Mary Jones, at her first application, apparently a healthy young woman, had been under my care three years for a diseased knee-joint; which, notwithstanding many consultations in the Infirmary, where every means in our power were ineffectually tried, ended in an abscess within the capsular ligament of the joint; and, in the month of September, she was so exhausted with pain,  
want

want of rest, hectic, and a large discharge, that she desired I would amputate the limb.

THE operation was done in every respect as in the foregoing case, and the wound closed with slips of sticking plaster. The symptomatic fever and pain were moderate, and no appearance of discharge through the dressings; these were removed on the 20th, the part had a favourable aspect, the inflammatory tension was moderate, and the discharge small.

DRESSED on the 21st: the circular bandage was replaced; three arteries had been tied; one ligature was drawn out this day, another the 22d, and the third the next day; from which time the edges of the wound were kept in contact by the adhesive plasters. She was treated in every respect as usual,

and no particular incident worthy of notice, occurred.

ON Saturday the 30th, I examined the wound, and found all its internal surface perfectly united and closed, and the external part yet unhealed, very small. In another week the wound was reduced to the size of a split pea, but had not a healing aspect; it was foul and fore, and she complained of a tenderness and linking pain about the extremity of the bone.

SHE was discharged the Infirmary, and lived with her friends in this town, where proper attention was paid to her occasionally. A small piece of bone worked out, after which the wound healed up immediately, and has remained so ever since.

ON opening the joint after the operation, it contained a large quantity  
of

of pus ; the cartilages and bones composing its internal surface, were found eroded, and highly carious.

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### C A S E XVIII.

#### *An AMPUTATION in the THIGH.*

IN the year 1780, Mr. F——, aged forty-two, who had lived in habitual excess for many years, in a drunken quarrel got a compound fracture of the leg. He was rudely conveyed home the distance of three miles : a surgeon was then called ; he placed the leg in the extended position, and applied a warm poultice. About two hours after his visit, the patient was attacked with a considerable hæmorrhage.

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I WAS now desired to visit him, and found an oblique fracture of the tibia, at a little distance from the knee joint, with a small opening through the skin; this I dilated, which led me to the point of bone appertaining to the upper part of the tibia, which was very sharp, I therefore took off its point; the other point of bone terminated close upon the capsular ligament of the joint. I placed the leg on its outside, in the relaxed position, with the knee bent; the cooling repellent topics were used, by which the hæmorrhage was effectually restrained.

THE patient appeared to do well for several days; after which, he was seized with a prodigious inflammatory enlargement of the knee joint, attended with fever, delirium, restlessness, and most violent pain; these were symptomatic of an abscess, which formed within the capsular ligament of the joint,

joint, and got vent through the present wound. Further particulars it would be uninteresting to relate. After many weeks' attention, the patient was so reduced by the largeness of the discharge, hectic, and repeated returns of diarrhœa, that a speedy dissolution would soon have taken place. I found all my endeavours to save his limb frustrated, and was necessitated to propose amputation, as the only chance for the preservation of his life: to this he willingly submitted.

NOVEMBER 28th, 1780, the operation was done, and the wound treated in every respect as in the foregoing cases; the oblique turn was fully used; the skin was saved in such a proportion, as to be easily approximated with the adhesive plaister. Before the dressings were applied, there appeared a great disposition to hæmorrhage from the whole surface of the wound; the blood

was

was very thin, and of a pale colour. I was in hopes, when the surface of the wound was closed, this discharge would stop; but it continued very slowly for several hours. In the course of the afternoon, he lost about five or six ounces of blood; the dressings were not removed; no sickness followed, nor any apparent inconvenience, either temporary or secondary, the wound uniting, as though no such accident had happened.

THE stump was dressed December 2d, for the first time: four vessels had been tied; one ligature was drawn out this day, another on the 4th, and the two last on the 7th. The sticking plaisters were discontinued after the first dressing, and renewed on the 8th day, when most part of the tension and soreness were gone, and the discharge was become well-conditioned; the secondary



condary union then took place very speedily.

A FORTNIGHT after the operation, the whole internal surface of the wound was perfectly united, and the external part healed to a small fungus, which was upon the orifice of a sinus that ran towards the bone. This fungus was about the size of a small pea, it was repeatedly touched with the lunar caustic, and the only dressing used was a linen compress, dipped in Aq. Calc. f. c. Sp. Vin. ten. This part discharged a little matter till December 26th, a month from the operation, when it was perfectly closed.

UPON opening the knee joint after the amputation, its whole internal surface was covered with matter, and had a purulent aspect; the cartilages were eroded, and the bone extensively carious.

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THE speedy and favourable termination of this case, in a constitution injured by habitual intemperance, by which, and a long confinement, the texture of the blood was so broken down, as to produce hæmorrhage from the whole wounded surface, is a proof, that we need not despair of union by this mode of operation in the most depraved habits. The stump was plump and even surfaced; the cicatrix small and drawn downwards; insomuch that the bone was perfectly covered with the old skin. He suffered some slight excoriations upon the cicatrix from neglect and imprudence; but in a few weeks, the extremity of the stump hardened, and he walks remarkably well.

IN the three foregoing cases, the limbs were rather large, and consequently the cellular and adipose membrane considerable; the oblique division

vision of the muscles was the more necessary, and therefore fully observed: these are not picked cases, but the three first upon which I have operated since my former publication. As much skin, &c. was saved, as easily covered the whole surface of the wound by the support and assistance of the adhesive plaisters. The fever and inflammatory symptoms were moderate; the union by the first intention considerable; the discharge small; and when well digested, the secondary union speedy, and much assisted by the close approximation of the wound by the adhesive plaisters; which likewise reduced the cicatrix to a narrow line. The bone was well covered with a thick flap; the cicatrix was drawn towards the under or posterior part of the thigh, or face of the stump, by the action of the flexor muscles, so as to be removed from the principal point of pressure, in using a wooden machine.

machine. This is generally the case, when the line is formed across the stump from side to side: indeed, I never formed it in any other direction, but have frequently seen it done by different surgeons.

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## C A S E XIX.

*An ANEURISM with an AMPUTATION  
in the THIGH, described by E. A.  
The OPERATION done by MR.  
DICKINS.*

AUGUST 24th, 1781, I was desired by Mr. Dickins, surgeon to the Wiltshire Militia, to visit a Gentleman, and was informed he had injured his knee some months ago by a fall from a horse. At that time he felt a pain in the ham, as he did frequently afterwards,

wards, particularly when that diseased point was laid upon the other knee in crossing the legs. The part had been enlarging for some time past, and was attended with lameness; but the patient, on a supposition that his disorder was rheumatic, gave it but little attention.

YESTERDAY he had most violent pain under the knee joint, and sent for his surgeon, who found a considerable swelling all round that joint, but particularly in the ham, where it was attended with tension, pain and pulsation. The patient was bled, had a fomentation and anodyne liniment to the part and a sudorific anodyne medicine internally, and was confined to his bed.

By the above treatment, the pain and tension were somewhat abated: upon particularly examining the part,

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the whole ham appeared to be filled up with a considerable tumor, which was somewhat tender to the touch and very tense, with a strong pulsation, perceptible from every point of the swelling. The part from which this motion proceeded with the greatest strength, seemed closely in contact with the inner surface of the skin; by applying the finger on this point, you felt the pulsation very strong, attended with a crepitus or crackling sensation. The pulsation was very extensive, and perceptible immediately by the side of the knee joint, by applying your fingers near the outside of each condyle of the femur: upwards in the course of the crural artery, the swelling did not go far, you might easily determine its extent, the tumor appearing to be uniformly rounded off, and the natural pulsation and size of the artery were evident: downwards this was not the case, the tumor and  
pulsation

pulsation extended within, and between the heads of the gastrocnemius muscle, and its termination was not perceptible. The calf of this leg appeared to be much larger than the other, and by measurement was actually found so; all the superficial veins were preternaturally distended. A pressure upon the calf occasioned pain in the center of the leg; a moderate pressure upon that part of the tumor pointing backwards and outwards in the ham, where the integuments were thinnest and most on the stretch, and where the crackling and pulsation were strongest, gave some pain, and the patient was troubled with the cramp, in the neighbourhood of the calf of the leg.

SOME time since, he had a considerable discharge of blood from his bowels; and upon this stopping, he thought he perceived the tumor in the ham; but upon questioning him very

particularly, it was dubious whether this, or the fall from his horse, had the principal share in the formation of his disease. I thought the whole history given by the patient appeared ambiguous.

THE disease was evidently an aneurism of the popliteal artery, of a considerable size: the patient, a young man with a very pale sickly countenance, although far from wanting muscular strength, yet his general aspect was unfavourable.

THE origin of the disease might be considered in a two-fold light; first, as originating from the injury formerly received by the fall from his horse, by which the arterial coats might have been so injured, as to be unequal to sustain the impetus, with which the blood was forced upon them; or, the disease might be an hæmorrhagic effort,



fort, a substitute for the discharge of blood from the bowels. It was difficult to judge from the patient's account, to which of these we might most reasonably attribute the disorder.

FROM a minute examination and consideration of the case, we gave it as our opinion, that it was incurable without amputation ; and that this was not a certain remedy, particularly if it was caused by an hæmorrhagic effort.

THE penetration of the tumor within the heads of the gastrocnemius muscle ; its size and deep seat, with the improbability of making a ligature below the disease in the leg ; its extent under the condyles of the femur and head of the tibia ; and the tenderness under the calf of the leg ; united with the ill success that has attended nearly all the attempts to cure this aneurism by

an operation, appeared sufficient arguments to forbid any experiments in the present case, had the patient been ever so assenting, and the surgeon so adventurous.

UPON stating the case to the patient, in every point of view which the nature of his situation indicated; deprived of all hopes of a cure otherwise than by amputation, and doomed to regimen, confinement, and the perpetual apprehensions attendant on the supposed risque of the tumor soon bursting, was the palliative plan to be pursued: he determined to part with the limb.

THE operation was done on Tuesday August 21st, by Mr. Dickins. The oblique turn was in some degree given to the knife; the large artery was taken up without including the nerve; but this could not be done in all the others, which were numerous, for it  
was

was necessary to tie nine. The stump was large, and from the quantity of adipose membrane, consequently loose and flabby. The circular flannel bandage was applied with sufficient tightness to support the parts; the skin then appeared rather superabundant, it was laid on, forming a line from side to side, with the ligatures drawn out as they next pointed to either angle of the wound. A stitch with the needle and ligature was made at the center of the wound through the skin, to secure it in the lineal direction that one edge might not overlap the other. The wound was superficially dressed with cerate.

CONSIDERING the nerves that were unavoidably included in the ligatures, the spasms were moderate; he had about four severe twitches in the afternoon; the Tinct. Thebaic. was given occasionally.

AUGUST 22d, the patient had passed a very easy night as to the stump; he had scarcely any symptomatic fever; notwithstanding the flannel roller was applied tight after the operation, it was now so relaxed, that you might pass your hand between it and the thigh, which is its peculiar excellence, for it becomes flacker from the time it is applied; hence it makes a pressure only while you want it. He complained of colic pains, which were attributed to fruit he had eaten before the operation: to remove this complaint Mr. Dickins had given some rhubarb, and it was now thought advisable to inject a glyster to dislodge the irritating cause, and bring down the rhubarb which had taken no effect.

ON the 23d, the symptomatic fever very moderate, and the stump easy, but still complaining of the bowels; the  
glyster

glyster had given only one stool ; a dose of ol. ricini was therefore advised, and after its operation an anodyne.

ON the 24th, the oil had operated freely, and the patient was easy in every respect ; the dressings were hard and offensive ; the weather being warm, they were therefore removed, and in place of the usual roller, the many tailed bandage made of flannel was applied, such as is used in compound fractures, with two slips to pass from below across the face of the stump, to keep on the dressings. The wound appeared to be well closed, only a line was visible, and the discharge very moderate.

IT would be uninteresting to give a further detail of each succeeding dressing, as no particular circumstance occurred. In ten days the wound was very trifling ; and in less than a month  
from

form the operation was perfectly healed, and has remained so ever since. The patient's general health had not been good for some time previous to the operation, he was therefore recommended to go into the country, and live temperately, from which he has received considerable advantage, and remains at this time (March 1782) free from any return of aneurism.

*Dissection of the diseased Part.*

SOME coloured injection, composed principally of tallow, was thrown into the crural artery; this ran very well, for the minute arteries were filled. Upon dividing the skin in the ham, which from distention was thinner than natural, the aneurismal sac immediately appeared; there was no interposition of adipose membrane, the sac filled up the whole ham, extended no further up  
the

the thigh, but terminated in a globular form, and the artery then became found. Downwards the tumor ran between the heads of the gastrocnemius muscle, which was largely divided by the knife, to bring the extent of the tumor into view ; it extended very close to that point where the arteria tibialis antica originates and penetrates the interosseous ligament. In the ham the aneurismal sac extended from side to side very broad, and its central and posterior points adhered to the posterior part of the capsular ligament of the joint, which now formed part of the aneurismal sac ; this was very thin at this point, and so united with the ligament and connected with the bones, that it was impossible to separate them, without making a wound the size of a shilling into the joint.

THE dilatation of the artery had forced the veins and nerve outwards,  
so

so that when the skin was divided, the nerve was found immediately under it upon the aneurismal sac, along its external and central part, on each side of which, lay the veins, at the distance of a finger's breadth from the nerve: the veins were varicous under the calf of the leg, where they were considerably distended, owing no doubt to the interruption of their contents, by the pressure of the aneurismal sac, which accounts for the dilated state of the superficial veins, and also for the pain from the pressure upon the calf of the leg; and the displaced and extended situation of the nerve, accounts for the cramps and numbness below the tumor; likewise over the aneurismal sac ran two arterial branches, very considerably dilated.

FROM the above account it appears that, if an attempt had been made to cure this disease by the operation, the  
 nerve,



nerve, arterial branches and veins, all running upon the surface of the aneurismal sac, would most probably have been wounded by the knife. We likewise see the impracticability of tying the artery below the diseased part, under the heads of the gastrocnemius muscle, without a most extensive and profound incision.

I HAVE been the more particular in relating the exact state of the parts, as the subject is of an interesting nature. Were surgeons as fond of candidly acquainting the public with their ill success, as they are of publishing their fortunate cases, I am of opinion that but few people would recommend the operation for the aneurism of the popliteal artery.

THE day preceding that on which it was determined to amputate the leg, I was repeatedly stopped in the street, and  
told

told that a young gentleman, who had just returned from attending the surgical lectures of an eminent operator in London, had pointed out a method of relieving our patient without the loss of his limb. On my return home, Mr. Dickins called upon me, and had received the same information, and that the mode of cure was by the operation of tying.

WE therefore determined not to amputate the limb, before we had in the most open and candid manner, both acquainted the patient with what we had heard, and urged him to consult the gentleman in London who had done the operation, and likewise given the pupil a fair hearing. Our patient resolved not to consult any other person, or submit to any attempt, but amputation.

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A CONSULTATION was held, with the addition of two other surgeons, as a security to our reputation, and to deliberate upon what the young gentleman had to advance. He informed us that Mr. — had once performed the operation of tying the artery in the popliteal aneurism with success; but we were not furnished with the least particulars of the case. After many arguments on both sides the question, it was unanimously agreed, that the experiment was not justifiable in the present case, as the disease extended so far downwards; that a single instance of success was not sufficient authority to direct our practice, when placed in opposition to the great number, where the operation had failed.

As I was very anxious to gain the particulars of the case, in which the operation had been performed with success, an eminent anatomist in London

don was prevailed upon to apply to Mr. —, and was so obliging as to return the following answer.

“MR. — could recollect but one case of popliteal aneurism, in which he succeeded by ligature. After the operation they were obliged to take up some other collateral arteries; but the patient at last perfectly recovered.

I RECOLLECT one case where Mr. — made the ligatures, and the cure seemed to go on very well for three weeks; the artery then burst, and the patient died. Mr. — found he had made the ligature on the diseased artery, which was injured much higher than he apprehended. He is rather an advocate for tying, if it can be done; but if the disease extends downwards in any great degree, and not upwards, I should presume there could be no other remedy except amputation.”

I WAS

I WAS favoured with the following account from Mr. Baxendale, my late pupil, who is now in London. "I have seen the operation for the popliteal aneurism attempted by Mr. — : it did not appear to me to be so large as that in — —, which I saw when with you. The artery was laid bare with the greatest difficulty; he passed a ligature, as was generally thought, under the artery at the upper part, and another was passed just above the bifurcation: the circulation was not afterwards carried on through the limb. On the third day he was under the necessity of having it taken off: upon examining the limb after the amputation, it was found that the upper part of the artery had not been enclosed in the ligature. I suppose the coagulable lymph plugged up the orifice, and prevented an hæmorrhage."

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SEE some judicious observations on the popliteal aneurism, in Wilmer's Cases, page 171.

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## C A S E XX.

*An AMPUTATION followed by an unusual degree of EMACIATION of the extremity of the THIGH BONE.*

IN the year 1780, I had an opportunity of examining a stump in the thigh of a boy, which had a particular appearance.

THE operation, at which I was present, had been done two years; the wound was covered only by skin and cellular membrane, and the muscles were divided by a perpendicular incision,

cision, without in the least giving the oblique turn to the knife.

THE cicatrix, which now appeared small, was drawn off the face of the stump backwards, by the action of the flexor muscles, and consequently the bone was perfectly covered with the old skin. The muscles of the thigh had retracted, and the bone wasted so as to become pointed, and not thicker than the boy's finger for three inches up the thigh. The extremity of the bone was so sharp, that the boy was totally deprived of advantage from any machine to assist him in walking.

AN incision was advised upon the point of bone, and a separation from its attachments, so as to admit of its being pressed out at this wound, and removed with a saw: but the parents would not consent to the operation.

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C A S E XXI.

*An AMPUTATION in the THIGH, in which there was too much Skin saved.*

IN the month of December 1779, I was present at an amputation above the knee. The patient was about forty years old ; he had long been afflicted with a caries of the tibia and fibula, attended with a large, foul, fungous ulceration of the neighbouring parts ; the bones were so considerably diseased, that a fracture happened merely from the degree of caries. The state of the patient's general health appeared very unfavourable, he being reduced to a state of great weakness, with a pale, languid, unhealthy aspect.

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A CONSIDERABLE quantity of skin and adipose membrane, more than sufficient to cover the whole surface of the wound, were saved.

THREE weeks after the operation I examined the patient; his general health was considerably improved; he was able to sit out of bed the whole day; nor had he been troubled with one unfavourable symptom. The stump had a rumpled irregular surface, a consequence of the superabundant skin forming into folds or wrinkles; its internal surface was united, and the external wound perfectly healed, except in the center; and here the upper edge lay so much over the under, that they could not be brought into contact: another ill consequence of the superabundant skin; and this proved the obstacle to a complete cure for a considerable time.

## C A S E XXII.

*An AMPUTATION in the FOREARM,  
in which there was too much Skin saved.*

I WAS present at the following operation, January 1780. An old slender delicate woman suffered herself to be reduced nearly to death, by the discharge from a caries of the bones forming the wrist-joint, before she would suffer amputation : at last however she submitted. A considerable quantity of skin and adipose membrane only was saved, but more than sufficient to cover the whole surface of the wound, as in the foregoing case ; to prevent the edges overlapping, they were placed in contact, and secured by the needle and ligature.

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AT the expiration of a fortnight from the operation I examined the stump, and found the whole internal surface united, and the external wound nearly healed; but the skin was puckered, and formed a rumpled, irregular surface.

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### C A S E XXIII.

*The* EXTIRPATION *of a* TUMOR *on the* HEAD, *where* DRY LINT *was disadvantageously applied as a* DRESSING.

IN the month of May 1780, Mrs. Johnson, aged 60, of Knowsley, in the parish of Prescot, came to this town for my advice. She had a tumor

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upon the upper part of the left parietal bone, which had been forty years in growing to the size of a small orange.

ABOUT a fortnight since it was accidentally bruised, which occasioned a small flough about the size of a fixpenny piece; this cast off and penetrated through the cyst, and consequently let out some thick matter of the consistence of honey. The tumor was not diminished in bulk, although the discharge continued very considerable and most highly offensive, and the patient was in constant pain, which extended from the tumor, all over the pericranium; she rested but poorly in the night, and her general health was consequently impaired. As the tumor did not diminish in bulk, notwithstanding the large discharge; and from considering the date of the disease, I  
judged

judged the cyst to be very firm and incapable of contraction. These considerations, with the other symptoms, determined me to recommend the removal of the whole, with the knife.

THE cyst adhered to the pericranium, but was separated by a cautious dissection, without materially injuring that membrane.

ON examination after the operation, the cyst appeared of a firm, gristly texture, and most part of it was filled with a matter, most highly offensive, and almost as hard as the cyst, from which it was separated with difficulty.

THE wound bled freely, the edge of it was covered with a lint pledget spread with cerate, and the rest of the wound with dry lint. It was three weeks before the lint perfectly separated ;

rated, it had formed so perfect an adhesion, and the granulations were so united with it, that many pieces of lint were left, which were picked out bit after bit at every dressing. This at the time occasioned pain, irritated the wound, and considerably protracted the cure: nay, even after the wound was healed, little pimples formed containing matter; from each of which we pulled out a small fibre of lint. This was constantly the case with the wounds after amputation, during my apprenticeship; when the surface of every stump was covered with a load of dry lint immediately after the operation.

CASE

## C A S E XXIV.

*The EXTIRPATION of a TUMOR on the SOLE of the FOOT, where the OL. TEREB. was applied as a DRESSING, with advantage.*

IN the year 1781, Mrs. ———, aged forty, from the neighbourhood of Congleton in Cheshire, came to this town to put herself under my care, for a complaint which had been forming three years. She was of a thin delicate constitution, and subject to frequent eruptions; which arose from a high degree of scorbutic acrimony. She had a tumor in the center of the foot, about the size of a small orange,  
of

of a blue aspect, rather firm in consistence; the basis was not so broad as its body, but so very firmly adherent, that I was convinced it was connected with the tendinous fascia, which originates from the os calcis, and expands through the sole of the foot.

THE tumor rendered that foot useless in walking, and discharged a large quantity of inodorous lymph, which appeared always collected in small drops upon the surface of the tumor, and soon wet through any quantity of linen placed under it.

By the want of air and exercise, with the large discharge from the surface of the tumor, and the anxiety from fear that the disease would turn out cancerous, the patient's general health was considerably impaired.

THE tumor had been more than once destroyed by caustics, and almost as suddenly



suddenly re-appeared. I advised her to have the whole disease fairly extirpated by the knife; to which she consented. In doing this, the fascia was found so connected with, or rather made a portion of the tumor, that it was necessary to remove a piece of it, the size of the wound. The hæmorrhage was large, from many dilated vessels; a piece of fine linen, a little larger than the surface of the wound, moistened in the Ol. Terebinth. was first applied; and over this, linen compresses and a roller. The patient remained the rest of the day, as free from pain, as is usual in similar cases.

ON the second day I removed the dressings, which all separated with the most perfect ease: the surface of the fore had a fine florid aspect; the tendinous fibres a most beautiful polish: in short, the whole looked as though the wound had been immediately made,  
and

and was not succeeded by any hæmorrhage: easy soft dressings were applied, and the part healed in a short time.

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## C A S E XXV.

*A vascular TUMOR on the FOREHEAD extirpated; after which the OL. TEREB. was advantageously applied as a DRESSING.*

IN the year 1781, a child of — Aspinwall's, in the township of Meal, and parish of Hallfall, was born with a small red tumor in the center of its forehead; which now increased in size, and appeared more red and injected, particularly when the child cried. It was seven months old when I first examined the swelling, which projected considerably, was very red, and when  
the

the child cried, the distention was so great, and the surface so thin, that the parents expected it would burst. Its increase in size had been so great, its base was equal in circumference to a half-crown piece.

THE experienced surgeon is well acquainted with the appearance and nature of these tumors; but I do not know that they are well described by any author.

As the tumor grew so fast, I was requested to remove it. I made a circular incision down to the pericranium, and dissected out the whole diseased part, guarding against a profuse hæmorrhage by a proper pressure, made with the fingers of attentive assistants, who were directed to press on the outer edge of the wound, as it was formed by the knife.

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IT is well known that the danger in the removal of these vascular tumors, arises principally from the great loss of blood which frequently follows the knife; and, as we are convinced by experience, that young children with great difficulty recover from the loss of much blood, too guarded an attention cannot be paid to this point. A removal of these swellings is very desirable, both to prevent a violent hæmorrhage from their being liable to burst, and the increased deformity from the constant increase of the disease.

I APPLIED the Ol. Terebinth. linen compresses, and a circular roller, as in the foregoing case, by which the hæmorrhage was immediately stopped. The child did well in every respect. Two days after the operation all the dressings separated with the most perfect ease, and left a clean fresh-coloured wound,

wound, which was perfectly healed in three weeks.

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## C A S E XXVI.

*Two SCIRRHOUS TUMORS extirpated, after which all the DRESSINGS were applied exterior to the SURFACE of the WOUND with advantage.*

IN the year 1780, the house-keeper of Mr. O——, in this town, applied to me to examine two tumors, from which she felt great inconvenience ; one was situated under the edge of the pectoral muscle, midway between the breast and arm-pit ; it was about the size of a small orange, had an uniform surface, and felt through its whole substance perfectly indurated : the other,

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nearly of the same size, lay in the same direction, deep-seated under the anterior fold of the axilla. She was thirty years old, and of a delicate constitution, but her general health was good.

A GREAT variety of medicines, both external and internal, had been unsuccessfully tried to resolve these tumors, which had been gradually increasing in size for three years; they were now extremely troublesome from their situation, as every motion of the arm occasioned pain. As I could give her no hopes of relief from medicines, she determined to have them taken out with the knife.

I MADE a longitudinal incision, of sufficient size to admit of the necessary separation of these tumors. The removal of the upper one proved very tedious from its deep situation: the edges of the wound were placed in  
contact,

contact, and all the dressings applied exteriorly to its surface. A considerable union took place by the first intention, particularly at the upper-part of the wound ; the inflammatory symptoms were very moderate, the discharge consequently small, and soon became well digested : the secondary union then succeeded ; and the wound, which had been large and deep, was nearly closed at the expiration of a fortnight ; after which she had no further trouble, and has ever since remained in good health.

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C A S E XXVII.

*A fresh incised WOUND, which penetrated a JOINT; where the DRESSINGS were applied exterior to the SURFACE of the WOUND, with advantage.*

MARCH 3d, 1781, a middle-aged man was sent to me from Gateacre with a wound in the hand three inches long; it run on the outside of the first finger, in an oblique direction across the joint, close to the next finger, and extended along the back of the hand: it penetrated the capsular ligament at the articulation of the finger with the metacarpal bone, and laid the joint so largely open, that you might see nearly the whole cartilaginous



ginous surface of the head of each bone.

THE wound had been made five hours before he came to me, and dressed with lint, moistened with bals. traumat. applied within the edges of the incision. This dressing was removed, and the part well washed to clear away the balsam, and give a fresh moist surface, which might be more likely to unite.

THE part was then closed with slips of adhesive plaister, but to prevent this being in contact with the edges of the wound, and hence causing inflammation, a small lint pledget covered with a cooling cerate was applied; over these I placed a linen compress moistened with Aq. Veget. miner. and prevented the motion of the finger, by a splint and compresses applied along the inside of the wrist,  
hand

hand and fingers ; these were retained by a roller. The wound caused little pain, inflammatory tension, or matter ; its whole internal surface united, and the external wound required but three dressings to complete the cure.

WERE I to insert all the cases which have fallen under my own observation, or those with which I have been furnished by my brethren, in proof of the propriety of the practice which I have recommended, it would answer no useful purpose ; the reader's time would be consumed, and the work wantonly enlarged. It is hoped that those which are selected, will be sufficient to illustrate each particular plan.

It has been my endeavour to bring the whole work into as small a compass as possible, and to deduce it entirely from practice. All theoretic reasonings and hypotheses are carefully avoided ;

avoided; and it is much to be wished, that this mode of writing in surgery were more perfectly expunged.

ALL the accounts which I have received and not published, are in favour of our proposed plan. Some surgeons have succeeded better than others; the difference must have arisen from either a difference in the mode of operation, a superior care in the after-treatment, or a more advantageous situation as to air. The first and second points I have more particularly endeavoured to explain and reduce to fixed rules, so as to enable those who are properly qualified, to operate in a similar way. If these be observed, their success in future must be nearly equal; making allowance for unfortunate incidents, which will ever occur.

AFTER what has been said on the pernicious effects of impure air, it is  
to

to be presumed, that this third source of obstruction to our success, will be particularly attended to by every surgeon, who is in the least concerned for his own reputation ; the welfare of his patient ; and the good of mankind.

T H E   E N D.











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